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Social Hierarchy & Social Networks: The Effects of Prestige and Dominance within a Developmental Context

Daniel J. Redhead

There has been a recent resurgence in interest about status and status hierarchies in human behaviour.

This development was spurred by Henrich and Gil-White (2001), who outlined a model for understanding status in humans, with two pathways to achieving status, via dominance and prestige.

The growing support that Henrich and Gil-White's hypothesis has gained has produced important insights within the field. However, questions still remain about the social processes that govern prestige, dominance and rank differentiation. The current research integrative social network theory and analysis with theory produced within the field of social hierarchy. Moreover, research was carried out among a network of social orphan within Romania; measuring prestige, dominance, influence and network effect. The results of the current research indicate that whilst all humans have the propensity to utilize prestige and dominance as rank acquisition strategies and that both pathways are viable routes for accruing rank. However, the evidence further suggests that socio-cultural processes and network structure largely govern an individual's behaviour and rank acquisition strategy.

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ACKNOWLEDGEMENTS

Having delved into the research head first, I know now that without the support from friends, family and colleagues, the completion of this work would never have been possible. Therefore, I would like to thank all of my friends and family for helping me and putting up with me throughout the year. I would also like to give special thanks to Diana Morrison for all of the words of wisdom, support and evenings reading and helping me to refine my ideas and drafts.

Moreover, I would like to specifically thank all of my research participants and research team in Romania, without whom, the current research simply wouldn't be possible. I would like to thank Romanian Social Services for giving me access to the research population and to further applaud the important work that you are doing for such a vulnerable population. Moreover, I would like to thank my research assistant, Zsuka Kavocs for answering any linguistic query that I had and patiently helping to translate all of the relevant documents from English into Hungarian and visa-versa. I wish you all the best for the future.

I would further like to thank all of those who have been involved in the current research. I would like to thank Dr. Jamie Tehrani for initially believing in my proposal and helping me to refine my theory and design. I would further like to thank Dr. Steve Lyon for helping me get to grips with social network theory and analysis and for patiently answering any ridiculous query that I have. Furthermore I would like to thank Prof. Joey Cheng for discussing theory with me, reviewing my statistical outputs and presenting my results at the forthcoming UCLA Behavior, Evolution, and Culture colloquium series. I would also like to thank Dr. Wendy de Waal-Andrews for all of her help with research design and analysis. Alongside this I would like to note how important the theoretical reviews of my early chapter by Prof. Chris Von Rueden were in refining my ideas and I would like to thank him for all of the time and effort he has put into helping me with the current research.

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Introduction

The recent resurgence in studies investigating social hierarchy has provided great insight into how personality, behaviour and physiology impact on an individual's ability to attain social rank. Over recent years there has been growing support for Henrich and Gil-White's (2001) dual model of social hierarchy, which augments theory in cultural evolution and outlines that social rank within human groups is governed by two distinct processes: prestige and dominance. Whilst there is a substantial and growing literature, fundamental questions remain unanswered. Evidence from social and experimental psychology has supported Henrich and Gil-White's hypothesis (see Cheng et al., 2010; Cheng et al., 2013). Yet empirical naturalistic evidence that has directly investigates the propositions made by Henrich and Gil-White (2001) is principally lacking. The current research addresses a number of unanswered questions within the field through a novel methodology and within a previously unrepresented population. Moreover, the current research, through the integration of social network analysis into the dual model of social hierarchy literature, provides novel insights as to the processes that drive rank differentiation in human groups.

Social hierarchy permeates all animal groups and research within the social and behavioural sciences has a deep history of studying the processes that drive power and status in social groups. As suggested by anthropologists and, recently, within psychological theory, human hierarchies share similarities with the hierarchical systems that govern other animals, whilst remaining somewhat distinct due to the human reliance on social learning and prestige (Chance, 1967; Chance & Jolly, 1970; Barkow, 1975; Henrich & Gil-White, 2001). Prestige, as an exaptation of dominance (Barkow, 2014), has a much younger evolutionary history. Building up on this theoretical standpoint, recent studies have provided important insights as to how individuals attain rank and the ways in which they use and maintain their influence (see Cheng, Tracy & Anderson, 2014). However, the dual model of social hierarchy is yet to be directly and robustly tested cross-culturally and questions persist about the social processes in which govern the optimality of prestige and dominance. Prestige and dominance may well be distinct, universal pathways to the top, with humans having the propensity to utilize them at any time. Yet the ontogenetic development and cultural influences of prestige and dominance have still to be determined.

The current research attempts to address a number of these unanswered questions. Evidence within developmental psychology further suggests that the attractiveness of dominant individuals seems to have a negative trend as individuals age (Pellegrini & Long, 2002). Nonetheless, within the current framework that integrates the dual model of social hierarchy, it is predicted that both prestige and dominance would promote social rank at all ages as both processes relate to social learning (Chudek et al., 2012; Flynn & Whiten, 2012) and also seem to predict popularity and friendship over time (Huizinga & Veenstra, 2012; Dijkstra et al., 2011). Furthermore, contrary to previous evidence, it is predicted that dominance, as well as prestige, will increase with age as both traits are forms of

embodied capital, in which are costly, risky and are more strongly expressed over time. Thus, it is predicted that age moderates the effects of prestige and dominance in a developmental context. Moreover, given previous evidence, a second prediction was made regarding the ontogenetic development and expression of prestige and dominance. It is hypothesised that, whilst there is a universal propensity for individuals to express both prestige and dominance, the efficacy and strength of such expression is governed by the cultural norms of and the experiences of the individuals and groups. Throughout development the socio-ecology has a profound impact on the development of personality and behaviour (Bandura & Walters, 1963) and, when individuals face adversity throughout development, evidence suggests that individuals seek to obtain their social and material goals through antisocial and delinquent means (Cohen, 1955a). Further evidence also suggests that children in aggressive groups nominate aggressive conspecifics as being cool and popular, whilst the contrary was found in non-aggressive groups (Rodkin et al., 2006; Laninga-Wijnen et al., in press), suggesting that the saliency of dominance and aggression is context-specific. Therefore, in contexts where rank attainment is not available through prosocial and legitimate means, thus where prestige is not necessarily selective or advantageous, individuals would become higher in dominance. The final prediction integrates social networks with the dual model of social hierarchy. As previous evidence suggests that both prestige and dominance predict social rank (Cheng et al., 2013; Von Reuden et al., 2010), it is predicted that they would also predict centrality within a social network. Within the literature, the most central individuals are often the most influential, powerful and have the highest status (Freeman, 1978; Lin, 1999). Therefore, as prestige and dominance are the two pathways to social rank, they should promote centrality within social networks.

Questionnaire, social network and ethnographic data were collected during fieldwork to empirically test these predictions. Data were collected during a month of ethnographic fieldwork among a group of social orphans in a summer camp in Romania. The current research population spans the entire period of ontogeny, which provides an important and fruitful platform for research into ontogenetic developments of prestige and dominance. Using previously validated round-robin prestige and dominance scaled-questionnaires (Buttermore & Kenrick, *Unpublished Manuscript*; Cheng et al., 2010), participants were asked to measure their peers and their own perceived prestige, dominance and influence within the group. Alongside this, social network and ethnographic data was collected to identify and measure a number of variables that may impact on an individual's relative rank within a group.

The current research provides novel evidence of that prestige and dominance both promote social rank within a developmental context. As previous research indicates, children and adolescents often defer to dominant, antisocial individuals; who, in turn, become some of the most popular individuals within the group (Hawley, 1999; 2003). Moreover, the effects of prestige and dominance, were moderated

by age; indicating that older participants were perceived as higher in both traits and also higher in social rank. Secondly, the current research sheds light into the socio-cultural processes that affect prestige dominance and social rank. Specifically, how self-perceived social marginalization from wider society affects the ontogenetic development of prestige and dominance. Results of the current research indicate that when an individual feels more marginalized within wider society, they are perceived as higher in dominance. Finally, the current research provides some of the first evidence indicating that prestige and dominance promote centrality in distinct social networks. Although neither prestige nor dominance had a significant relationship to centrality within an influence network, results suggest that prestige predicts centrality within a cooperation network, whereas dominance predicts centrality within a resource control network. In sum, the current research makes a number of contributions to growing literature on social hierarchy and provides the framework for more substantial future research.

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Key Terms & Concepts

Social Hierarchy

Social hierarchy can be defined as the “implicit or explicit rank order of individuals or groups with respect to a valued social dimension” (Magee & Galinsky, 2008: 5; Gruenfeld & Tiedens, 2010). In extension to this it is fundamental to include that individuals within the group who are of high rank receive greater influence, deference, attention and, at times, culturally valued resources than subordinates (Cheng & Tracy 2014, 3). The conflation of these two definitions accommodates the different types of hierarchy that are observed in human societies, while remaining concise enough to allow for the determination of the factors that govern social asymmetries. Furthermore, the definition allows for the different levels of understanding that individuals within groups have of their social standing, and the ways in which roles and consensual agreement of social positioning are made.

Social Networks

The social world is governed by the ties and relations that individuals have with those around them. Social networks are comprised of individuals (nodes) who are connected by network ties, such as similarities (i.e. location, attributes: Mizruchi & Stearns, 1988), social relations (kinship, cognition: Killworth et al., 1990), interactions (talking, playing: Marsden, 1987) and flows (information, resources: Wellman & Wortley, 1990; Ford & Fulkerson, 1962). The repetition and strength of such ties affects its weighting, presenting the different types of relationships that individuals have within a network. Social networks have been defined as relational systems that are characterized by the social ties of the actors within them (Wasserman & Faust, 1994). Moreover, the size of an individual's network and their relations within such networks has profound effects on their behaviour and hierarchical position (David-Barrett & Dunbar, 2012). Through a network perspective, key insights can be gained about why individuals act the way they do within human networks. Network theory has a deep history in the social and behavioural sciences, developing into an interdisciplinary field of study that formally outlines human relations through descriptive, visual and statistical modelling. Building on the ideas of Georg Simmel, social network theory sees the world as “nothing but and interaction of elements”, with society being a collection of humans, with connectional ties and reciprocal influence (1908 [1971]). This approach provides a formal method for understanding the processes that govern social groups.

Verticality and Social Rank

All forms of human hierarchy are malleable (Sapolsky, 2005; Van Vugt et al., 2008) and fall within a vertical dimension (Hall & Friedman, 1999; Hall et al., 2005). Verticality within group structures is defined as a low-to-high continuum of individual position (Burgoon & Dunbar, 2000; Keltner, Gruenfeld & Anderson, 2003). This continuum is influenced by a number of different social

processes and has a high level of variation (Hall et al., *in press*). Verticality can be observed in human groups as the social influence an individual has within adolescent friendship networks (Hollingshead, 1949), celebrity (Tehrani, 2013) or the symbolic power of royalty. Moreover, it is important to note that verticality is a theoretically similar concept to social rank. They are two sides of the same coin. Verticality describes steepness and malleability within a hierarchy. Yet Social rank is the positioning of individuals within the hierarchy. Individuals at the acme of a hierarchy will have greater influence and control, whereas mid-rank low-rank individuals are often subordinate and provide deference towards high-ranking members of a group (Henrich & Gil-White, 2001; Anderson & Willer, 2014; Anderson & Kilduff, 2009; Goffman, 1967; Keltner et al., 2008). However, social rank and hierarchic differentiation are dependent on the steepness of verticality within a group (David-Barratt & Dunbar, 2013) and are, thus, contextually dependent. For example, within a hierarchy high in dominance, verticality would be steeper than within a prestige-based hierarchy, as social positions and power are more dyadic and unequal (Henrich & Gil-White, 2001). Moreover, social rank and verticality are similar and connected, yet distinct concepts. The current research will have focus only on social rank and within a social network.

Antecedents of Social Hierarchy

Prestige

Prestige is defined as “respect and approbation accorded to one by others” (Barkow, 1989, 203). It is important to note that the definition used in the current research is not that of Henrich and Gil-White (2001) and does not include “freely conferred”. The removal of freely conferred is due to the philosophical issues surrounding free will (see Barkow, 2014), adding scientific assumptions that have not been directly tested to an already complex concept. Previously, prestige within a social hierarchy had been referred to as being a ‘hedonic mode’ (Chance, 1967; Chance & Larsen, 1976; Chance & Jolly, 1970) and both hedonic hierarchies and prestige bias are to some extent describing ‘role models’ (Barkow, O’Gorman & Rendall, 2013). Prestige refers to influence, high social rank and leadership that is granted to an individual by others within a group or network (Cheng & Tracy, 2014; Barkow, 1989, 2014; Van Vugt et al., 2008; Price & Van Vugt, 2014; French et al., 1959) and is consummated by the individual through their skill within a socially valued domain and prosocial behaviour (Henrich & Gil-White, 2001; Chance, 1967; Cheng et al., 2010).

Dominance

Unlike prestige, acquiring social rank through dominance is a process based on egocentrism where individuals obtain power and influence through fear, manipulation and coercion. Dominance is

defined as “power and influence over others” (Cambridge Dictionary). It is important to note the use of power and not status to describe dominance. Power is strongly correlated with dominance (Blader & Chen, 2014) and individuals high in dominance have a more introspective approach to rank attainment (Blader et al., 2013; Fiske, 2010). Indeed, selfish motives for rank attainment can be observed in all individuals (Barkow, 1975). However, individuals of high dominance often employ antisocial methods for obtaining rank and are associated with a number of behavioural and physiological traits that promote aggression and forcefulness (Sidanius & Pratto, 2001; Buss & Duntley, 2006; Cheng & Tracy, 2014; Blaker & Van Vugt, 2014; Anderson & Cowen, 2014). This behavioural suite is believed to be a phylogenetic legacy for humans, with social dominance operating strongly in all other primate species (Bernstein, 1976; Eibl-Eibesfeldt, 1961; de Waal, 1986; King et al., 2009; Ellis, 1995).

Dimensions of Social Rank

Status

Social status is a dimension of social rank that is often associated with prosocial behaviour and prestige. Within social psychology, status is often used to describe prestige and prestige is not a commonly used concept (Magee & Galinsky, 2008; French & Raven, 1959; Fast et al., 2012; Hays, 2013). However, prestige and status are distinct, yet strongly related, concepts. While prestige describes a process and associated behaviours in which an individual would obtain rank, status describes something that an individual possesses through prestige, esteem and respect (Fiske, 2010; Ridgeway, 2001). Status is the perceived worth of an individual to the group, through the evaluation of a number social, behavioural and non-verbal cues. It must be noted that, unlike previous research status is defined as being distinct to power.

Power

Power is not always associated with the prosocial antecedents of social rank and can also be obtained and maintained through antisocial, fear-inducing and egocentric means. Power is in the eye of the beholder (Fragale et al., 2011), and those in positions of power are defined by their disproportionate and asymmetrical control over group resources (be they material or social; Galinsky et al, 2003; Keltner, Gruenfeld & Anderson, 2003; Gruenfeld et al., 2008; Magee & Galinsky, 2008). Aggression is not a universal for power-holders and is associated with self-perceived incompetence within a social role (Fast & Chen, 2009). Unlike status, individuals possessing power are not necessarily perceived by their peers as competent and may feel threatened by others within the group who have higher perceived competency but lower power, leading to ego defensiveness and, thus, aggression (Baumeister, 1998; Maner et al., 2005; Fast & Chen, 2009; Case & Maner, 2014). An important note

is that, whilst dominance is closely associated with power, it is theoretically distinct. Individuals can be dominant without having power, and conversely, can be powerful without being dominant.

Centrality

Within social network theory, individuals who are higher in centrality should be the most prominent and influential individuals in their network. Centrality is described as being the amount and the strength of the ties that a node has, and thus the visibility of a node within a network (Wasserman & Faust, 1994). The work of Bavelas, Leavitt and colleagues in the late 1940s and early 1950's were the first to approach the idea of centrality. The results indicated that individuals with higher centrality were more influential and aided in the efficiency of communication flows (Bavelas, 1950; Leavitt, 1951; Bavelas & Barrett, 1951). However, this notion of centrality led to confusing result in future studies, urging further development into the properties of centrality within a network. Freeman (1979) developed three formalized theories of different types centrality: degree, closeness and betweenness. Degree centrality describes the number of ties that a node holds and is associated with how active a node is within a network (Freeman, 1979; Friedkin, 1991). Closeness centrality refers to the distance between all nodes within a network and is observed by calculating the length of the shortest path between nodes (Freeman, 1979). Moreover, closeness centrality is associated with network efficiency, of which was described by Bavelas as information flows more quickly and effectively through shorter paths (Freeman, 1979; Bavelas, 1950). Betweenness centrality measures the amount of times a node acts as a bridge between other nodes, which denotes an individual's control of information and communication within a network (Freeman, 1979). Moreover, Bonacich (1972) also proposed that eigenvector centrality was important for understanding a node's influence within a network. Eigenvector centrality accounts for the entire relational pattern within a network and computes an individual's influence proportionately by assessing the value of the ties that a node has (Bonacich, 1987). For example, if a node's ties have a large amount of ties themselves, they become more valuable. Furthermore, there are a number of different measures of centrality within social network analysis, yet all forms of centrality provide an indication of a node's prominence within a network.

Outcomes of Social Rank

Influence

Influence is described as an individual's ability to shape and alter the behaviours other those around them. Individual influence over a group is a distinct psychological phenomenon that is an individual's response to over social and environmental pressures and has had an expansive history within the social sciences (Cialdini & Goldstein, 2004; Cialdini & Trost, 1998). These socio-

environmental pressures may range from the overt authority that a power-holder may wield (French & Raven, 1959; Raven, 1964)) to subtle ‘foot-in-the-door’ techniques (Freedman & Fraser, 1966). Influence is intrinsically related to hierarchy, and is a downstream consequence of constructs within hierarchy, such as prestige, dominance, power and status. In laboratory-based group experiments, individuals who were perceived as being high in prestige, dominance, power and status have often been reported by their peers as being some of the most influential individuals within studies (Cheng et al., 2010; Cheng et al., 2013). Within the ethnographic record, influence also seems to be directly related to the antecedents of social rank described within the current framework (Henrich & Gil-White, 2001; Renfrew & Bahn, 1996; Chagnon, 1988; Gurven et al., 2014; Von Rueden, 2014). Moreover, the nature of influence is dependent on an individual’s characteristics and the social environment of the group. In some circumstances, it may be beneficial for high-rank individuals to refrain from wielding their influence (Magee & Galinsky, 2008). Nevertheless, asymmetrical influence within a group always arises within a group and is arguably beneficial to social coordination.

Leadership

Leaders emerge within groups through the individual’s disproportionate influence, status and power within a group. Leadership has been defined in a number of ways within the social sciences. However, the definition provided by Van Vugt, Hogan & Kaiser (2008) is most appropriate. In their article, they define leadership as an individual’s ability to influence others to contribute to group goals and coordinate the pursuit of such goals (Van Vugt et al., 2008, 182-183; See also Bass & Stogdill, 1990; Hollander, 1992). Thus, alongside influence, leadership is important for group survival (Van Vugt et al., 2008) and has co-evolved with a number of adaptations that support leadership (Cosmides & Tooby, 1992), such as psychological coordination mechanisms (Argote, 1982), intelligence (Kanazawa, 2004); behavioural suites and emotions (such as prestige and dominance; Cheng et al., 2010; Tracy & Robins, 2008; Nettle, 2006; Ames & Flynn, 2007); info-copying and social learning (Henrich & Gil-White, 2001; Barkow, 1975; Richerson & Boyd, 1980); and deference (Chance, 1967; Henrich & Gil-White, 2001). Moreover, the evolutionary importance of hierarchy and leadership will further be discussed throughout section 1.2.

Deference

If there are leaders and influential individuals within groups, there must also be those who defer to those of high rank. Deference is described as “a yielding or submitting to another’s judgement or preference out of respect or reverence” (Henrich & Gil-White, 2001). This dyadic interaction has evolved to benefit both the group’s overall cohesion and also the interests of the individuals (Henrich & Gil-White, 2001). Low-rank individuals do often defer to those at the pinnacle of a hierarchy, yet they are not necessarily the ‘have-nots’ that Weisfeld & Beresford (1982) describe. Rather, subordinates who choose to defer are often agentic and do so to gain information and benefits from

those in elevated positions (Dentan, 1979). This would only be specific to hierarchies in which prestige operates as the most influential antecedent of social rank. Otherwise, deference may be caused by fear of high-ranking, dominant individuals; creating a transactional leadership (Hollander, 1958) where deference is a social exchange in which individuals have calculated and internalized the costs and benefits of deference and resistance.

3

Social Hierarchy

Social hierarchies are ubiquitous among human societies. Social asymmetries are never absent within or between human groups (Leavitt, 2005; Barkow, 1975) and issues surrounding social rank have bearing in all aspects of social life (Cheng & Tracy, 2014; Chen et al., 2012). The term social hierarchy can describe groups of vast demographic and cultural radius. Before attempting to formulate an understanding of processes included in rank differentiation, one must have a strong grasp of what demarcates social hierarchy. Whilst there have been interdisciplinary advances within the field, the complexity of and disparity between observed hierarchies has prevented a universally accepted terminology of social asymmetries. This is to be expected when addressing the vast literature on hierarchies from a multitude of disciplines, as the variation between research questions and theoretical perspectives has caused dissent among scholars studying status processes and organisational structures (Pearce, 2011).

When does Hierarchy Emerge in Human Groups?

Social hierarchies are ever-present within social species, facilitating social organisation, social selection and resources distribution. There is a great deal of variation between hierarchies both within and between species. However, each type of hierarchy provides answers to the same evolutionary issues that all social groups encounter.

The Evolution of Primate Rank Differentiation

Primates are unique in their interdependence for survival. Whilst there is large variation in group living both within and between primate species, all species seem to have social structures that regulate individual actions and behaviours within the group. The prevalence and success of group living indicates that this form of social organization has numerous selective advantage (Krause & Ruxton, 2002). For example, group living aid in preventing predation (Alexander, 1974), can govern mating strategies (Schultz et al., 2011) and facilitates food collection and defence (Clutton-Brock, 1974; Wrangham, 1980). The structure of primate groups and the infrequency of collective action limit the need for leadership (Gintis et al., 2015). Rather, dominance hierarchies have emerged within both sexes of most primate species. Within such dominance hierarchies, self-interest and egocentric behaviours prevail, resulting in individuals possessing dominance characteristics, having exclusive access to social and material resources, and, thus, higher fitness (Maestripieri et al., 2007). However, human hierarchies seem to be unique in their structure and promotion of prosocial, other-oriented behaviour. A number of theories have posed explanations for this discrepancy between human hierarchies and those seen in other primates. Moreover, it seems that human reliance on social

learning and cultural transmission has created the ‘human niche’ and prestige hierarchies (Henrich & Gil-White, 2001; Chapais, 2015; Laland, et al., 2000; Van Schaik & Burkart, 2011; Flack et al., 2006). Whilst social learning and prestige seem to be driving fundamental differences between human and non-human primate hierarchies, this has not yet been empirically tested using comparative studies. Therefore, it is noted that this theoretical distinction is used cautiously and with an appreciation that there is on-going debate surrounding this subject.

Primates, Dominance and Hierarchy

Humans have a deep, phylogenetic legacy for dominance hierarchies. An evolutionary survival from before the hominin split, dominance hierarchies are stable and have persisted as the governing social structure in all other contemporary primate species (Chapais, 2008; De Waal, 1997; King et al., 2009). Dominance hierarchies among primate species provide a number of benefits, such as alpha displays towards predators or rival groups and offspring protection (Wilson, 2000) and triadic power interventions, providing hierarchical stability as the alpha prevents conflicts among subordinates (Boehm, 1994). Dominance hierarchies have high levels of verticality (high levels of inequality between conspecifics: Hall et al., 2005; David-Barrett & Dunbar, 2012) and often have an omnipotent alpha that commands power over resources and access to mating partners within the group (Goodall, 1986). Rank attainment within non-human dominance hierarchies is heavily reliant on an individual’s physical strength, size and fighting prowess (Chance, 1967; Remis, 1995). This reliance on physiological traits for rank differentiation would suggest that the social structure of these dominance hierarchies is largely determined by genetics (Schultz et al., 2011). For example, in Wittig and Boesch’s (2003) study on female Chimpanzee hierarchies, dominance behaviours and power over food were observed to have the strongest effect on individual rank, outweighing the effect of age. Nonetheless, dominance within primate hierarchies is also context-dependent (Chapais et al., 1991). For example, studies on female macaques have shown that individuals are only motivated to challenge alpha and high-ranking others if they have become socially isolated (Chapais, 1992). Whereas beta and gamma male chimpanzees have been observed to continuously challenge the alpha within the group until either are overpowered (De Waal, 1982; Nishida, 1983). Furthermore, as evidence suggests, non-human primate hierarchies have often been described as arenas of agonistic dominance. Yet recent theoretical positions suggest that there may be more than one way to attain rank.

Recent theoretical and empirical evidence has suggested that dominance in primates is not solely centred on physical intimidation and agonism, but also competency, coalition and proto-prestige (for a review see Chapais, 2015). In wild orang-utans, females gave males sexual privilege if they provided food; if males withdraw from sharing food, females would not grant the sexual access (Van Noordwijk & Van Schaik, 2009). In human’s closest living relatives Pan (Chimpanzees and

Bonobos) there are coalitional effects, such as rank challenges and levelling within dominance hierarchies (Pandit & van Shaik, 2003). Rank changing effects often occur when Beta males within a Chimpanzee hierarchy challenge the alpha, relying on coalitional support from other males to even the distribution of both social and material resources (Goodall, 1964; de Waal, 1998). Evidence from a meta-analysis of fourteen primate species has inferred that obtaining coalitional support is not, however, based on creating fear, but proto-social acts and services, such as grooming (Schino, 2001; Barrett et al., 1999). The proto-prosociality observed in non-human primates and coalitional and leveling effects observed within Pan thus lay an evolutionary framework for understanding the success of hierarchies based upon coalition and group consensus in human groups (or prestige hierarchies, Henrich & Gil-White, 2001; Chapais, 2015; de Waal, 1998; King et al., 2009; Boehm, 2000); while still accepting the human genetic condition for agonistic and coercive behaviour towards others and the persistence of dominance (Wrangham & Peterson, 1996; Henrich & Gil-White, 2001; Hawley 1999; Cheng, et al., 2010; Cheng et al., 2013).

What's so Special about Human Hierarchy?

The human mind, alike to any other animals, is affected by the social environment, with natural selection operating in the same manner on human psychology as it does with physiology (Sloan Wilson, 1994; Cosmides & Tooby, 1992; Gurven et al. 2014). It seems that human hierarchy and sociality are unique in their complexity in comparison to other mammals, resulting from a number of evolutionary pressures and adaptations (Barton & Dunbar, 1997; Whiten & Byrne, 1988). Evidence suggests that human brain size correlates with a number of factors relating to social complexity (e.g. male mating strategies (Pawlowski et al., 1998), social group size (Dunbar, 1992; Hill & Dunbar, 2003), frequency of social learning (Reader & Laland, 2002; Dunbar, 2002; Adolphs, 1999), and complexity of social bonding (Dunbar & Schultz, 2007). Further traits, such as language, social cooperation and social intelligence (Buss, 2005; Van Vugt & Schaller, 2008), were also adaptive and were therefore selected, as individuals possessing such traits would be most capable of gaining social and material resources crucial for survival and reproduction (Van Vugt et al., 2008). However, many cultural anthropologists and psychologists argue that the human mind is fundamentally molded by culture, with human enculturation beginning at birth and creates discrepancies in psychological phenomena that have been observed cross-culturally (Markus & Kitayama, 1991; Gurven et al., 2008). Both perspectives are correct. The human mind is adapted to the environment in which the majority of human evolution took place (Van Vugt, et al., 2008; Dunbar, 2004), yet is moderated by culture (Richerson & Boyd, 1985; Feldman & Laland, 1996; Kendal, 2013; Gintis, 2003). Therefore, human capacities for social and technical inheritance have coevolved with the cumulative cultural evolution of social norms, conventions and technological advances: creating a human niche (Kendal, Tehrani & Odling-Smee, 2011; Tomasello et al., 2005; Laland et al., 2007; Flynn et al., 2013).

From the emergence of the hominin lineage around 6.5 mya (Langergraber, 2012) hominin social evolution has created group processes and hierarchies that favour group-oriented and prosocial behaviour over dominance. The first physiological condition, bipedalism (documented in *H. ergaster* or *H. erectus*) has had a significant impact on human cognition and cultural ability, as contemporary human upper-body has provided for psychomotor abilities to craft tools and material cultures (Wood & Collard, 1999; Maslin et al., 2015). Gintis et al. (2015) propose two further social events within human evolution that contributed to prosocial, prestige hierarchies: a) control over fire and, b) production and use of lethal weapons. It is proposed that control over fire (the first instance of which has yet to be effectively dated) favours greater sedentism, as one would need a 'base' where food is transported for preparation, which in turn would promote cooperative hunting and food-sharing, which has persisted in most contemporary immediate-return societies (Cashdan, 1980; Weissner, 1996; Blurton-Jones, 1987; Gurven & Jaeggi, 2015; Hawkes, 1991; Hill et al., 2011). Alongside this, the production of lethal weapons caused a reduction of dominance within human groups, as there would be less weighting on physical prowess for rank attainment and greater expected costs during agonistic competitions (Woodburn 1982; Gintis et al., 2015; Chapais, 2008, 2013). Moreover, Gintis et al. (2015) postulate that these conditions selected for non-authoritarian, competence-based (prestige) hierarchies (see also Chapais, 2015).

However, this approach to the evolution of human rank differentiation does not account for a number of traits within human hierarchies. Firstly, the conclusions made by Gintis et al. (2015) are assumptions, with relatively little and contradictory evidence supporting the relationship between the control of fire or the use of lethal weapons with non-authoritarian leadership. Moreover, the basis of Gintis et al.'s (2015) line of reasoning for lethal weapons levelling dominance is somewhat flawed. The introduction of weapons may increase costs of agonistic conflict, yet that does not make physical prowess redundant in the human race for status. It is a common misconception to see physical prowess as being exclusively influential on dominance rank, as evidence suggests physical strength and size among humans is positively correlated with both prestige and dominance (Kaplan & Norton, 1996; Cheng & Tracy, 2014; Von Reuden et al., 2008; Blaker & Van Vugt, 2014). These physiological traits can be used to confer benefits to others, not solely costs (Von Rueden, 2014). Therefore, it is no surprise that within studies of human groups, individuals who are physically taller and stronger have been judged as higher in status, conscientious and obtain higher leadership positions (Blaker et al., 2013; Wilson, 1968; Cashdan, 1998). For example, within Amazonian societies, such as the Tsimane (Gurven & Von Rueden, 2006; Von Rueden 2011), the Achuar (Patton, 2000) and the Mekranoti (Werner, 1982) leadership is strongly related to an individual's size, strength and prowess in combat. Furthermore, the notion that human hierarchies are essentially devoid of successful dominance hierarchies is also contentious. Boehm's (1999, 2012) theory of 'reverse dominance', proposes that human groups have coalitional mechanisms that prevent an individual from

accruing too greater power and status. Unlike non-human primates, subordinate individuals band together and have mechanisms in which to limit the power of the leader (i.e. gossip and allegiance: Boehm, 1999; Scott, 2008). Thus leaders must behave appropriately to maintain deference from others within the group and a consensual leader-follower decision structure is promoted (Van Vugt, et al., 2008). The power thus lies in the majority, rather than the leaders. Of which is true in many cases, yet the importance of dominance within human hierarchies should not be overlooked. Evidence suggests that human hierarchies can still allow individuals to acquire rank and influence through dominance (Cheng et al., 2013; Shi, 2015; Magee & Galinsky, 2008; Chagnon, 1998). Thus Boehm's explanation of 'reverse dominance' explains why human dominance is not typified by agonistic or violent behaviour, but with coercion and resource control, rather than a replacement of dominance. Nonetheless, the explanations proposed by Gintis et al. (2015) are insightful in their ideas about the derivation of prestige and competence hierarchies. Yet, flanking other limitations, the theoretical model falls short in explaining human reliance on social learning and it's impact of the evolution of hierarchies and prestige within human groups.

Henrich & Gil-White's (2001) dual model of social hierarchy has focus on the human reliance on social learning and has gained substantial support. This dual-pathways framework is based on ethological and evolutionary approaches, drawing on established work in primates (Ellis, 1995; Kappeler & van Schaik, 2002), and augments developments in modelling cultural evolution (Richerson & Boyd, 2005; Henrich & Boyd, 1998; Mesoudi et al., 2004). Henrich and Gil-White (2001) explain that humans often differentiate rank within prestige arenas, instead of agonistic competitions. This was urged by changes in the nature of cultural transmission during hominin evolution, where selection began to favour innovative strategies for augmenting social learning (Henrich & Gil-White, 2001; Boyd & Richerson, 1985; Durham, 1991; Barkow, 1989). These changes, in turn, selected for psychological mechanisms that aid in individual choice and selection of learning models through verbal and non-verbal queues and promote greater prolonged proximity to a model, which further facilitates social learning through acts of deference (Henrich & Gil-White, 2001; Barkow, 1989). Thus Henrich and Gil-White's (2001) dual model proposes that hierarchic interactions are an exchange, individuals high in prestige obtain deference within the group, while other gain proximity to learn social valued skills and knowledge. This interaction, driven by social learning, fundamentally altered human hierarchy and sociality. Individual behaviour is moderated through this transaction. If an individual does not behave accordingly, they do not gain access to models (Price, Tooby & Cosmides, 2003; O'Gorman et al., 2009) but, on the other hand, if a learning model does not behave appropriately, they will not maintain a deference network (Price & Van Vugt, 2014). Therefore, behavioural (Cheng et al., 2010, 2013), physiological (Blaker & Van Vugt, 2014) and material (Miller, 1987; Plourde, 2010, 2008) cues within prestige hierarchies are crucial for the selection of social learning models, which explains why human hierarchies have evolved differently

to, while maintaining a phylogenetic legacy for dominance, observed in other primates (Henrich & Gil-White, 2001).

Henrich and Gil-White's (2001) framework for understanding the evolution of human hierarchy has been supported by a considerable amount of evidence within the ethnographic record and in cultural evolution experiments. Numerous ethnographies have shown a correlation between high skill and high status (Kaplan & Hill, 1985; among the Semai: Dentan, 1979; the !Kung: Lee, 1979; and the Nuer: Evans-Pritchard, 1950; to name only a few). Acts of deference towards high status individuals have also been observed (America: Gross & Johnson, 1984; Tsimane: Von Rueden et al., 2011). And for example, among the Ache, husbands often forgive and ignore their wife's sexual infidelities if they perceived her partner to be a highly skilled hunter (Hawkes, 1991). In addition, a recent study investigating behavioural variation among small-scale societies in South America found that the main factors influencing variation were social learning and cultural history (Mathew & Perreault, 2015). Debate continues over the role of dominance in human hierarchies, as there is limited evidence in support of the persistence of agonistic dominance within human groups. Nevertheless, among the Yanomami, it seems that an individual who is feared and has proven combat ability is also highly influential and successful reproductively (Chagnon, 1990). While there is extensive evidence in support for Henrich and Gil-White's (2001) model in a naturalistic setting, experimental evidence has only emerged recently. Chudek et al.'s (2012) study indicated that children between the age of four and five would choose a type of food that an adult who had received high amounts of attention from others had chosen, thus emulating prestige bias among children. The results of Atkisson et al.'s (2013) study, in which participants engaged in a computerized hunting game, are consistent with the Chudek et al.'s (2013) findings, indicating that adults are also more inclined to choose models who have received the most attention from others. Furthermore, in Boothroyd et al.'s (in prep) current study, an attentional bias (in males) towards danger-related interaction and rank challenges was observed (presenting findings that complement previous studies: Cheng et al., 2013; Maner et al., 2008). Therefore, in light of the growing body of evidence in support, Henrich and Gil-White's (2001) dual model of human hierarchies, seems to provide a robust explanation as to why human hierarchies are so unique.

Moreover, socio-environmental pressures faced by humans during the major period of evolution (or the environment of evolutionary adaptedness: Foley, 1997), such as the physiological and social change and dependence on cultural transmission; provide robust explanations for why human hierarchies formed. Not all factors contributing to the emergence of hierarchy (i.e. population growth: Johnson & Earle, 1987, Henrich & Boyd, 2008 and seasonal food storage: Testart et al., 1982) have been fully discussed. These factors may have impacted on the emergence of stratification among human groups. However, in view of the abundance of evidence supporting the relationship between cultural transmission and prestige hierarchies, the current research will test only the model

proposed by Henrich and Gil-White (2001).

How do individuals attain social rank?

As briefly outlined previously, antecedents to social rank are wide-ranging. However, two main antecedents, prestige and dominance, circumscribe all others and provide a platform for individuals to attain and maintain their rank.

Prestige and Dominance are Distinct Pathways to Rank Attainment

In both a naturalistic studies and laboratory experiments, prestige and dominance have been observed as a way in which individuals attain social rank. A recent study by Cheng et al. (2013) provided the first empirical evidence that directly tests the dual model of social hierarchy. The study assessed the prestige and dominance using two separate methodologies: 1) the Lost on the Moon exercise (Bottger, 1984), where participants were tasked to rank-order 15 items for their importance for survival on the moon both privately and in a small group setting; 2) using video recordings from the previous study, a visual attention exercise, eye-tracking participant's gaze and assessing the effects of prestige and dominance on human attention. Post-task round robin prestige and dominance questionnaires (Buttermore & Kirkpatrick, *unpublished manuscript*; Cheng et al., 2010) were completed by participants, which allowed self-rated and peer-rated prestige, dominance, influence, agency and likability. The results supported the dual model, with both prestige and dominance predicting perceived social status. The effects of prestige and dominance on attention have also been replicated in a current study furthering support for this perspective (Boothroyd et al., *in prep*). A number of studies have concluded that dominance was not a viable route to influence (Carli et al, 1995; Ridgeway, 1987). Yet methodological issues bring these conclusions into question. Actual fear was often not directly tested and, therefore, the studies were analyzing individual attempts of failed dominance (Cheng & Tracy, 2014). Thus, only support the notion that dominance is not a successful route to rank if fear was not present (Chase et al., 2002). Within the ethnographic literature the effectiveness of dominance for rank acquisition has also been called into question. Barkow's (1975) theory of prestige hierarchies outlines that prestige exapted from dominance hierarchies. This has been further supported within the ethnographic record, with previously discussed evidence supporting the notion of 'reverse dominance' (Boehm, 1999). Nonetheless there is limited ethnographic evidence that dominance is successful in small-scale societies.

The distinct nature of prestige and dominance is fundamentally emotional and derive from separate personality traits. Whilst prestige and dominance are both correspond with the big five personality traits (neuroticism, agreeableness, openness, conscientiousness and extraversion: Barrick & Mount,

1991) and encapsulate personality variation in humans (Nettle, 2006; Sih & Johnson, 2004), they interact differently. Individuals high in prestige are perceived as likable, communal, conscientious, agreeable, other-oriented and highly agentic (Buttermore, 2006; Buttermore & Kirkpatrick, *unpublished manuscript*; Cheng et al., 2010). Parenthetically, dominant individuals are characterized by their egocentrism, manipulative nature, high agency and disagreeableness (Cheng et al., 2010). These divergent personality traits are explained by the dual nature of pride: hubristic and authentic (Tracy & Robins, 2008; Tracy & Matsumoto, 2008; Steckler & Tracy, 2014). Emotions play a large role in navigating the social world, with a number of emotions moderating behaviour and providing cues for an individual's position within a hierarchy (Steckler & Tracy, 2014; Schwarz & Clore, 1983; Al-Sahwaf et al., 2015; Tracy & Robins, 2009; Cowlshaw & Dunbar, 1991). However, pride seems intrinsically related to prestige and dominance. Prestige is related to authentic pride, which promotes humility, prosociality and a willingness to share expertise (Tracy & Prehn, 2012; Cheng et al., 2010). On the other hand hubristic pride promotes aggression, egocentrism, narcissism and a lack of empathy, all of which relate to dominance (Tracy et al., 2009; Cheng et al., 2010). Nonetheless, prestige and dominance are not types of individuals.

Prestige

The emotions underpinning prestige are associated with the cultivation of perceived competence, respect and admiration, in which urges deference and increases an individual's rank. Nonetheless, individuals cannot always attain rank and status solely through behaviour. To further nurture prestige relations and status, an individual must harbour skills and expertise that are deemed as fitness enhancing. These skills, especially in small-scale hunter-gatherer societies, are related to an individual's physiology, providing embodied capital (Kaplan et al., 2003; Von Rueden et al., 2008; Von Rueden et al., *in press*). This triad of skill, behaviour and physiology provides the fundamental backdrop to how individuals attain rank through prestige.

Behavioural Prestige

As outlined by Henrich and Gil-White (2001; Cheng et al., 2010; see also Barkow, 1989) prestige hierarchies are moderated by behavioural tendencies and strategies, of which serve as a cue to the value of an individual. Prestige is highly correlated with status within groups and status is further an agent of group perception.

Prosociality and Self deprecation. Prosociality is defined as voluntary individual actions that are beneficial to other members within a group without the request or expectation of direct compensation (Gurven & Winkling, 2008). Humans understand prosocial norms and varying behavioural values through social learning within their culture (Chudek & Henrich, 2011; Gintis, 2003). Therefore prosociality is diverse and dependent on the social ecology in which it is learnt (Bell et al., 2009).

Prosocial dispositions have a strong positive association with success in attaining leadership positions within small-scale societies (Von Rueden, 2014). Prosocial leadership orientation has emerged, of which is a facet of prestige and is an adaptively calibrated personality type within human groups (Von Rueden et al., in press; Lukaszewski & Von Rueden, 2015; Sih et al., 2004; Nettle, 2006). Prestige is associated with authentic pride, where individuals often express agreeableness, confidence, genuine self-esteem, and conscientiousness (Tracy & Robins, 2009; Hart & Matsuba, 2007), that further promotes perseverance for individuals to complete and excel in tasks (Williams & Desteno, 2008). Evidence also suggests that both adults (Anderson et al., 2012) and children (Chudek et al., 2012; Birch et al., 2009) prefer to socially learn from models that display both prestige characteristics and are confident. During Anderson et al.'s (2012) study, adult learners showed bias towards models who displayed high levels of confidence, conferring such individuals higher rank than their personal skills would necessarily entitle them. However, individuals that conduct themselves in a prestigious manner cannot become over-confident and arrogant, as these characteristics may 'break a leader' (Ames & Flynn, 2007). For example, among the Semai of Malaysia, elders and those of influence wield it lightly, as individuals in the group may simply stop 'hearing' them if they believe them to be acting too authoritatively and arrogantly (Dental, 1979).

Altruism and Cooperation. Individuals employing prestige strategies often act in a manner that is deemed as selfless, generous and having the best interests of the group at heart. Altruistic individuals are perceived as valuable to the group (Price & Van Vugt, 2014). However, this altruism can be explained as reciprocal, in that it is mutually beneficial to both the individual and the group (Trivers, 1971). The group are provided with a fitness-enhancing service, whilst the individual is conferred prestige and influence (Willer, 2009; Milinski et al., 2002; Barclay, 2004; Hardy & Van Vugt, 2006). Moreover, this relationship creates a sense of competitive altruism; with individuals who seek rank acting altruistically when they are publicly observed (Griskevicius et al., 2010; Kafashan et al., 2014). The public nature of such altruistic acts and their relationship with rank-attainment may explain the high levels of prosociality, egalitarianism and prestige within ethnographic accounts (Hardy & Van Vugt, 2006). For example, among the Hadza of Tanzania, highly successful hunters share the spoils of their kills with others within the group (Hawkes, 1991). This conditional sharing allows hunters to safeguard for when they are less successful, but also provides status, demonstrating their individual value to the group (Hawkes, 2000; Bliege-Bird, 1999). This also seems prevalent among the Lamalera of Indonesia, where the individuals who share most occupy the highest positions within the society (Nolin, 2012). Nevertheless, these individuals and groups can only have accumulated such wealth through their skills and abilities, of which are central to perceived competence, value to the group and, therefore, prestige.

Skills and Expertise in socially valued domains. Within social learning systems individuals acquire knowledge and behaviour through observation and direct tutelage (Bandura, 1977). Individuals of

high rank gain most attention from other members of the group (Cheng et al., 2013; Boothroyd et al., *in prep*), making them the most likely models to initiate social learning (Henrich & Gil-White, 2001; Barkow, 1977). Central to prestige, demonstrated skills and expertise in socially valued arenas provide ample reason for individuals to defer to models due to the fitness-enhancing benefits previously discussed (Henrich & Gil-White, 2001; Barkow, 1977, 1989; Sugiyama & Sugiyama, 2003). Task-based skills, intelligence and competency are the most cited qualities that govern leadership (Bass & Stogdill, 1990; Lord et al., 1986). For example, among the Shuar of Ecuador, individuals perceived as being the most skilled and, thus, most valuable contributors to the group are preferred as leaders (Price, 2003). Moreover, in small-scale societies, hunting skill seems to be one of the strongest predictors for high status in men (Gurven & Von Rueden, 2006; Von Rueden, 2014; Wiessner, 1996). Furthermore, among a number of societies, hunting ability is highly correlated with male reproductive success (Hill & Hurtado, 1996; Kirchengast, 2000; Chagnon, 1979). Whilst hunting is crucial in the determination of male rank in hunter-horticulturalists, skills in creating tools, weaponry and material goods also play a central role. For example, members of the Kalahari !Kung attribute the success of a hunting kill to the individual whom produced the arrowhead and do not regard those who killed the animal (Dowling, 1968).

The reliance on such skills is ecologically dependent and has created diversity within human prestige arenas, meaning that there are different leaders for different roles. Although it is predicted that prestigious individuals would be learned from and influential beyond their domain of expertise (cross-domain prestige: Henrich & Gil-White, 2001; Henrich & Broesch, 2011), certain abilities may not transcend the barriers of different prestige arenas. For example, in academia, numerous individuals hold titles of prestige and are revered by colleagues within their fields, such status of which is granted through the critical judgments of their peers (Bloch, 2002; Hargens & Hagstrom, 1982). However, a distinguished professor in thermodynamics would have prestige-impact on academics within theology. Rather, prestige competition is strategic, with individuals vying for rank in arenas that play to their strengths (Barkow, 1989). By selecting an arena that they have skills in, individuals are more likely to be perceived as valuable to the group and, thus, conceive greater prestige.

Prestige and Embodied Capital. A multitude of social and physiological cues indicate an individual's embodied capital and thus increase the perceived value of the individual within the group (Kaplan 1996). Embodied capital theory outlines that the effort invested in growth and maintenance of phenotypic traits is an investment in future reproduction (Kaplan, 1996; Kaplan et al., 2009). These traits become fitness-enhancing as well as costly through their ability to generate benefits for other members of the group, which, in turn produces prestige, as proximity and deference are exchanged (Von Rueden et al., 2014; Kaplan et al., 2009). For example, development in physical size and muscularity is costly, as growth needs a bounty of nutritional resources (Deibert et al., 2004). However, physical strength and size are foremost components of an individual's embodied capital. In

an evolutionary context, being stronger and larger indicated an advantage in defending the group from predators, managing in-group conflict and combating rival groups or bands (Van Vugt et al., 2008; Von Rueden et al., in press; Van Vugt & Kameda, 2012; Sell et al., 2012; Coy et al., 2014). Moreover, evidence suggests that individuals who are physically stronger are perceived as attractive social partners and gain rapport as having great hunting ability (Apicella, 2014; Von Rueden et al., 2008; Lukaszewski, 2013). For example, among the Tsimane, physical strength is perceived as being an indicator of a male's ability in food production, and notably has a loose association with perceived prestige, not dominance (Von Rueden et al., 2008) and was strongly associated with an individual's success in leadership contests (Gurven & Von Rueden, 2006). This human bias towards physically strong leaders has also been observed in W.E.I.R.D societies. For example, height partially predicts the outcome during US presidential elections (McCann, 2001; Stulp et al., 2013) and experimental evidence suggests that individuals associated physical height with intelligence, prosociality and health (Blaker et al., 2013; Lukaszewski & Roney, 2011).

Dominance

Through a multitude of physiological and behavioural traits, individuals may produce fear, causing other members of the group to defer to them.

Physiology and Contest. As dominance strategies are primarily based upon fear and threat, physiological cues to an individual's ability to inflict harm are important while striving for rank through dominance. Archaeological evidence suggests that conflict was widespread, enough to create a selective pressure for physical formidability (Manson et al., 1991). Skeletal evidence displays frequent trauma (Guilaine & Zammit, 2001; Berger & Trinkhaus, 1995) and everyday weapons, such as hand axes, may have been associated with conflict, acting as tool-weapons (Thorpe, 2003). Moreover, Levantine Spanish rock art arguably depicts numerous conflicts during the Mesolithic (Beltran, 1982; O'Connell, 1995). Therefore, as a phylogenetic survival, contemporary humans assess the value of social partners, and thus form assumptions about an individual's leadership ability through a number of non-verbal markers (Van Vugt, 2006; Blaker & Van Vugt, 2014).

Fundamental in the determination of an individual's ability in physical combat is their physical strength and size (Archer, 1988). The size of an individual successfully predicts their combat ability, especially in males (Sell et al., 2012). This was also found among the Tsimane, with individuals perceiving those pictured as taller, with stronger biceps, as being most likely to win in a fight between two individuals (Von Rueden et al., 2008). Humans also perceive those to be larger and stronger to be more aggressive and intimidating (Archer & Thanzami, 2007; Pellegrini et al., 2007). Further experimental evidence suggests that individuals with higher muscle mass behave in a more aggressive manner, act less cooperatively and more egocentrically (Gallup et al., 2010; Petersen et al., 2013). These traits, moreover, predict an individual's position within human groups. Among the Amazonian

Xavante, individuals become leaders through their perceived ability in combat and intergroup raiding (Maybury-Lewis, 1974), of which is also found among the Yanomamo (Chagnon, 2011).

There has been conflicting evidence indicating a relationship between facial structure and perceived dominance. Males with larger width-to-height ratio are have arguably been observed to be more aggressive and have greater success in physical combat (Carre et al., 2009), and during times of conflict, individuals with a wider ratio are more successful in leadership votes (Little et al., 2007). Experimental evidence also suggests that males with lower vocal pitch have greater perceived dominance (Puts et al., 2006). Both of these non-verbal traits are regulated by the amount of testosterone in the body, thus may have some link to aggression (Lefevre et al., 2013; Puts et al., 2012), a behavioural trait central to an individual's perceived dominance.

Behavioural Dominance. Alongside non-verbal cues of dominance, an individual's behaviour affects their perceived dominance and, thus, their position within a group. Competition between conspecifics does not only affect physiological phenotypes, but has also selected for dominance-related behavioural tendencies (Alexander, 1989; Flinn et al., 2005). This suite of traits, whereby an individual may have a tendency to act in a forceful, self-assured and assertive manner (Buss & Craik, 1980), has been coined dispositional dominance, (Wiggins, 1979). Dispositional dominance, unlike dominance explained through evolutionary theory (Henrich & Gil-White, 2001; Cheng & Tracy, 2014), is not centred on inducing fear in others. This trait dominance has been associated with high rank and attaining leadership positions. For example, a meta-analysis of leadership within corporations outlined that dominance was a greater and more reliable predictor of leadership than any other antecedent (Lord et al., 1986; see also Judge & Bono, 2002). There are a number of reasons why individuals who act in a dominant manner attain higher rank, especially in a business setting. Dominant individuals are more likely to compete for rank, get themselves heard and feel more comfortable about giving orders to others (Van Vugt et al., 2006). Experimental evidence also suggests that dominance is often linked to perceived competence, with studies finding that, regardless of their actual competence in tasks, dominant individuals were perceived as competent and therefore granted status within the group (Anderson & Kilduff, 2009). Moreover, Judge et al. (2004) found that dominance was strongly associated with an individual's perceived verbal, cognitive and task-related abilities.

Within Henrich and Gil-White's (2001) account of human social hierarchy, individuals attain influence and, thus, social rank through the induction of fear and aggression towards others. This definition of behavioural dominance outlines that dominance is not only based upon the traits described above, but also aggression, coercion, manipulation and threat (Cheng et al., 2013; Cheng & Tracy, 2014; Hawley, 1999). It must be stressed that these behaviours are not fixed and that individuals are not necessarily dominant. Rather, individuals act dominantly in certain situations as

they may deem that behaviour, either consciously or subconsciously, as an appropriate strategy to attain rank. Moreover, this explanation of dominance may provide further reasoning for why certain behavioural syndromes have persisted among humans and may, in fact be fitness-enhancing. For example, individuals with aggression syndrome have a general tendency for aggressive behaviour (Sih et al., 2004). However, all individuals monitor their aggression levels dependent on the situation and in certain ecological circumstances (such as athletic competition) aggression is favoured (Sih et al., 2004). Evidence suggests that children accept dominance, deferring to aggressive individuals, who control most group resources, due to fear of reprisal (Hawley, 2003; La Freniere & Charlesworth, 1983). Nonetheless, there is little evidence suggesting that human adults defer to agonistically dominant individuals. In an experimental study, Manson et al. (2014) found among American undergraduates that individuals who had high levels of subclinical primary psychopathy, were more conversationally dominant and, thus had more influence within a conversational group setting.

Behaviourally dominant individuals also maintain their power and rank through egotistical and antisocial means, at times employing strategies that may be harmful to a group. Dominance often leads to power, rather than status. Essentially, rank is taken by dominants, rather than given. An individual who has acquired status and power within a group through prestige routes may turn towards more dominant means to maintain their position if threatened (Henrich et al., 2015; Case & Maner, 2014). As high rank allows an individual greater control over resources, they may decide to withhold resources to others to punish their challenges (Keltner et al., 2003). As observed in contemporary and historic companies and governments, leaders grow accustomed to power and financial privilege, which may lead to corruption and exploitation of others to maintain these benefits (Kipnis, 1972). Further, leaders may act in a way that is deleterious for the group to achieve and maintain their personal goals (Mead & Maner, 2012). Recent experimental evidence suggests that individuals high in dominance use a 'Divide and Conquer' strategy, preventing others within a group from forming a competing alliance (Case & Maner, 2014). Such strategies have been observed in Chimpanzee populations, where alpha males ostracize beta and gamma males to prevent them from many any ground in challenge attempts (de Waal, 1982). These results are, moreover, in keeping with Henrich and Gil-White's (2001) hypothesis, as dominants are motivated by self-interest, preventing individuals attempting to attain deference through prestige by marginalizing them.

4

Integrating The Dual Model of Social Hierarchy with Social Networks

4

Integrating the Dual Model of Social Hierarchy with Social Networks

Human Social Networks

The study of non-human primates through social network analysis has gained recent popularity, providing great insight into primate social structure and behaviour. Whilst the use of social network analysis for understanding human groups was popular during the 1960's and 1970's, only a small number of primatologists utilized network theory (Fedigan, 1972; Kummer, 1968; Hinde, 1976). Such theory has aided in understanding the social structure of great ape communities as being comparable to human networks, and by observing structural and behavioural differences an appreciation of the ecological and evolutionary factors that have shaped human sociality can be formed (Whitehead, 2008; Hinde, 1976; Wey et al., 2008; Gray, 1987). There are three important reasons for studying both human and non-human primate networks within behavioural ecology. The first is that the structural divergence within and between primate species may indicate the different ecological pressures constraining and selecting for certain organizational structures and behaviours (Wrangham, 1987; Runciman et al., 1996). The second factor is that sociality, social strategies and cultural transmission are affected by the structure of groups (Henrich & Broesch, 2011; Kasper & Voelkl, 2009). The final factor is that the analytical tools used in social network analysis allow for the identification of individuals who play socially significant roles within a group (Flack et al., 2005; McCowan et al., 2008).

Human networks are characterized by their stability, long-term relationships between nodes and cooperation. These networks are inordinately larger than those observed in other primate networks (Hill & Dunbar, 2003). An explanation for this is that there are cognitive constraints to network size within animals, with the size of a species' neocortex predicting the approximate number of individuals a node may have intense interaction with (Dunbar, 1992; Barton & Dunbar, 1997). Evidence suggests that in both ethnographic settings and W.E.I.R.D ecologies (Hill & Dunbar, 2003), human social networks tend to comprise intensive interaction with a network of around 150 individuals. For this reason human behaviour is observably different to other primates and human networks are structured differently (Wey et al., 2008).

Marrying the Dual Model of Social Hierarchy and Social Networks

Social Hierarchy and Social Networks

Within any human group there are networks of interaction and processes that form the framework of the group's structure and rank differentiation. Being social animals, and having high levels of interdependence (Boyd & Richerson, 1985; Bowles & Gintis, 2001; Henrich & Gil-White, 2001),

individuals are connected to and often reliant on a vast number of conspecifics. Such interactions provide channels in which behaviours are shaped and emulated (Brass et al., 1998; Bowler & Brass, 2006; David-Barrett & Dunbar, 2012), information is socially transmitted (Henrich & Broesch, 2011; Mesoudi & Lycett, 2009; Mesoudi & Whiten, 2008; Atkisson et al., 2012; Tehrani & Collard, 2009), and reputations are formed (Macfarlan et al., 2013). All three channels are interconnected. Behaviour affects the formation of reputations, and therefore influences an individual's rank and position within a network. Yet the structures of networks also affect individual behaviour and, thus, to some extent, dictate hierarchical processes. Through this logic, inequality within a network will be produced as individual interaction is governed by behaviour, and certain individuals will attain more interpersonal connections and high rank. Moreover, certain nodes may become 'keystone individuals' (Sih et al., 2009). Within social network theory, these individuals occupy positions of disproportionate influence within a group, being of high degree, reach and centrality; controlling flows and possessing important social network traits (i.e. behaviours, aggression, prestige and conflict mediation: Flack et al., 2006; Henrich & Gil-White, 2001; Sih et al., 2009). Thus, a form of social stratification (or a hierarchizing effect; Barkow, 2014) will always occur within networks, through interpersonal judgements of network members and benefits of hierarchy for a network (Henrich & Boyd, 2008; Croft et al., 2008; Samuels et al., 1987; Hill et al., 2008; Nagy et al., 2010). Previous studies within network literature have made important advances by connecting social status, social rank and behaviour (David-Barrett & Dunbar, 2012, 2013; Henrich & Broesch, 2011; Lin, 1999).

The proposed framework for understanding hierarchical social networks is adapted from Blader and Chen's (2014) causal model of social hierarchy. Through this framework, a much-needed unification of hierarchy literature and social network analysis is possible. Blader and Chen (2014) highlight a number of relevant and important distinctions within the hierarchy literature that are necessary for further advancement and understanding within the field. Nevertheless, an extension of their framework is necessary to capture the broad wealth of antecedents, dimensions and outcomes of social hierarchy and social rank. As will be argued throughout the current research, social networks play an important role in rank differentiation. Moreover, as Blader and Chen's framework is from the perspective of social psychology, a number of important theoretical concepts from both Anthropology and Sociology have been overlooked and must be addressed.

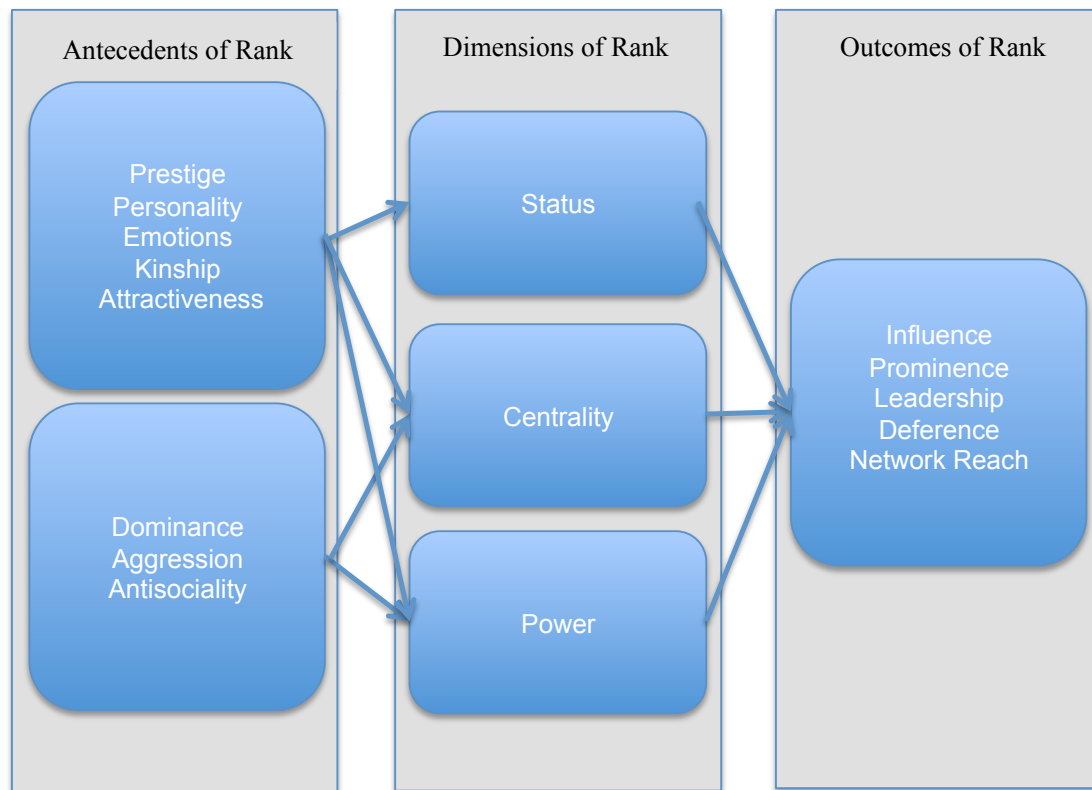


Figure 1: An updated integrative framework of social hierarchy

Centrality.

Within social networks individuals (or nodes) vary in their levels of connectedness to others. Such connections affect behaviour and social positions within a given network (Wey et al., 2007; Borgatti et al., 2009; Wasserman & Faust, 1994) and could therefore be deemed a structural dimension of social rank. Ties between conspecifics are measured by their in-degree and out-degree relationships to determine the types of relationships that are being observed (Sueur et al., 2011). For example, in-degree ties towards an alpha male within a non-human primate network are often observed as positive acts of deference (such as grooming), which are not mutual ties; whereas out-degree ties from the alpha male may often be observed as negative acts of aggression, indicating dominance processes within the hierarchic network (Newman, 2003; Silk et al., 2004; Flack et al., 2005). However, due to the human dependence on social learning, information flow may also be important for understanding social position. For example, high out-degree information flows and in-degree interactions (such as attention and deference) would indicate that the individual was of high status and, therefore, prestige bias transmission processes were apparent (Henrich & Broesch, 2011; Mesoudi & O'Brien, 2009). Moreover, the social network approach has proven fruitful for understanding prestige bias within humans and dominance hierarchies in non-human animals separately. However, to the best of my knowledge, no study has directly linked the prestige-dominance model of hierarchic differentiation with social network analysis. Therefore the structural relationship of social networks with prestige,

dominance and social rank provides a fruitful area for future research.

The types of relational ties that individuals have affect their centrality and behaviour. If an individual has numerous and strong direct ties within the network (high degree centrality), they are more likely to behave prosocially (Bowler & Brass, 2006; Makagon et al., 2012; Macfarlan et al., 2013).

Therefore, it is predicted that an individual with high degree centrality within their network would most likely be high in prestige and, thus, pursue higher rank. This assumption is made due to a number of theoretical distinctions. Firstly, an individual with high degree centrality will feel obliged to act prosocially to maintain friendships and may have kinship ties, which are often associated with altruistic action (Hamilton, 1964; Trivers, 1971; Axelrod & Hamilton, 1981; Landgraber, 2012). It has been observed in numerous studies that individuals who have the most kinship ties are the most central and influential within a network (Chagnon, 2011; Walker et al., 2013), which may also explain why older individuals within small-scale societies usually hold high-ranking positions.

Cohesion and Density.

Network structure can have a profound effect on a group's or individual's behaviour and performance. Networks have been explained through their cohesiveness, with researchers distinguishing between 'tight-knitted' and 'loose-knitted' communities (Bott, 1957: 59). Bott's (1957) notions of group cohesion were developed further into network density theory, which is formalised as the ratio of ties in a network to the maximum number of possible ties (Barnes, 1969: 117). Moreover, network density has been associated with social capital (Bourdieu & Wacquant, 1992), of which is described as the amount of resources that an individual or group commands through consistent exchanges and valuable social ties (Bourdieu, 1986 [2011]). Social capital is, moreover, reliant on four factors: social values, social norms and moral obligations and social networks (Putnam, 1993). Greater amounts of reciprocal ties and transitive triplets contribute to network closure, aid in the production of social norms, prosocial behaviour that generate trust and cooperation between nodes (Coleman, 1990; Granovetter, 1985). On the other hand, structural hole theory outlines that social capital is a result of loose network ties and the diversity of information flows and exchanges (Burt, 1992). A lack of cohesive ties increases the ability for autonomy within networks, allowing for more swift information flows between a leader or manager to a larger number of nodes (Burt, 2005). Nonetheless, as Burt (1984) notes, the lack of cohesion in a network may promote conflicting motivations, perspectives and allegiances that are not easily married together; whilst a network that is cohesive has a normative order that is beneficial to network performance (Podolny & Baron, 1997).

Homophily, Contagion and Behaviour

Within social network theory, network structure and social pressures are intrinsic to node behaviour. The types and structures of relationships within a network affect the behaviour of individuals (Brass et al., 1998), and individuals may emulate the behaviour those close to them (behavioural contagion: Wheeler, 1966; Burt, 2005; Marsden, 1987). Evidence suggests that behavioural contagion operates within human groups and has a considerable impact on sociality within groups (Polansky et al., 1950; Berkowitz, 1984). A longitudinal study on twins in Denmark (Christiansen, 1977), indicated that monozygotic twins spent most time together and, moreover, had greater levels of behavioural concordance over time. This idea extends into criminological theories about antisocial behaviour (Jones & Jones, 2000). For example, in adolescent groups, antisocial boys seem to be in the same friendship group, conducting delinquent acts together (Akers et al., 1979). Evidence from developmental psychology has further supported the notion that contagion is linked to the ontogenesis of prosocial behaviour (Kartner et al., 2010; Chartland & Lakin, 2013). For example, a study on infant emotional contagion and prosocial tendencies suggested that from the age of one, individuals are able to differentiate between themselves and others, but over time begin to harbour sympathy and empathy for others and in a prosocial and similar way to those that they are connected to (Davidov et al., 2013). Furthermore, it seems that the networks that an individual operates affect their behaviour, with people acting more like those that they are close to over time.

On the other hand, the causal relationship between structure and social behaviour is not yet determined. Behavioural similarity may spread through a contagion effect, with individuals acting more like their friends and family through repeated contact. However, evidence suggests that the reverse may also occur, with individuals preferentially selecting others who share their behavioural traits. This process, coined homophily (or selection), is centred on this notion that similarity breeds connection (Lazarsfeld & Merton, 1954; McPherson et al., 2001). For example, among adolescent groups, homophily within networks is often found regarding gender and sex and adolescent peer groups are often characterized by being all-male or all-female (Smith-Lovin & McPherson, 1993). Whilst in adult groups confidant, marriage and friendship networks are often delineated by homogeneity of ethnicity and level of education (Marsden, 1987). In a recent study in Romania, social trust within a classroom network of adolescents decreases when there is greater ethnic diversity (Badescu & Sum, 2015). Complimentary to these findings, a longitudinal network study in Hungary found that adolescent friendships were split by ethnicity, with non-Roma students disliking those who they perceived as Roma (Boda & Neray, 2015). Moreover, in adolescent groups, studies illustrate that cliques and friendship groups also base membership on behavioural homophily, with behaviours (such as drug-taking and alcohol consumption) being more important for friendship than behavioural influence or contagion (Kandel, 1978; Steglich et al., 2010).

Cooperation, Reputation and Transmission

Through the actions of individuals within social networks, reputations begin to emerge; with the types of ties that nodes accrue affecting their perceptions of others. There are two leading evolutionary theories for explaining the emergence of cooperation, and the patterning of social interaction and events within a network: kin selection (Hamilton, 1964) and reciprocity (Trivers, 1971; Mauss, 2000; Hamilton & Axelrod, 1981). Although the evolutionary process is characterized by competition, natural selection can favour cooperation if two individuals are genetically related (Hamilton, 1964; Dawkins, 1976). However, the benefit-to-cost ratio must outweigh the average number of neighbours per individuals (Hamilton, 1964). Evidence indicates that kin selection occurs within social networks, with support cliques often comprising mainly of kin (Dunbar & Spoors, 1995) and kin often living closer to each other than non-kin (Hill et al., 2011). Moreover, among the Hadza, genetic relatedness predicts campmate connectedness and also prosocial behaviour in gift-giving games (Apicella et al., 2012).

On the other hand, reciprocity within social networks can also explain cooperative behaviour. The unique levels of cooperation among individuals whom are not genetically related characterise human networks and, thus, kin selection may only explain part of the story (Trivers, 1971). Reciprocity has aided in the evolution of human cooperation as individuals may feel obligated to return favours in fear of exclusion and may receive material, social and sexual benefits through acting cooperatively (Mauss, 2000; Trivers, 1971; Alexander, 1987). A large body of evidence highlights the relationship between reciprocity and cooperation, such as the prisoner's dilemma (Axelrod, 1980; Adreoni & Miller, 1993) and exchange networks (Cashdan, 1985; Leider et al., 2009). Within exchange networks, reciprocity can be both direct and indirect, with humans often helping others without any expectation of direct return (Alexander, 1987; Boyd & Richerson, 1989; Nowak & Sigmund, 2005). The returns from these actions are indirect but are non-the-less fitness enhancing, producing reputations within networks, which has arguably led to the evolution of morality and social norms within human communities (Alexander, 1987; Ohtuki & Iwasa, 2004; Nowak & Sigmund, 2005).

Prosocial reputations surface through both indirect reciprocity and specific behavioural traits. Reputations are a set of perceptions and evaluations about specific individuals that a network forms (Alexander, 1987). Individuals track both the number and the breadth of cooperative acts of others within the network to form perceptions and reputations (Fu et al., 2008; Macfarlan et al., 2013). Individual's who have accrued prosocial reputations through cooperative acts therefore have more ties to other nodes within a network, becoming more central, having greater information flows and higher influence over others (Granovetter, 1985). Furthermore, individuals with prosocial reputations gain more social support within a network. For example, within production networks of bay oil in rural Dominica, evidence suggests that an individual's prosocial reputation predicts the amount of times

others aid them in production, of which is crucial, as help is necessary for effective production (Macfarlan et al., 2013). It seems that individuals within networks prefer close proximity and common interaction with those who have a prosocial reputation.

Prestige and Transmission Networks

In tune with Henrich and Gil-White's (2001) account of social hierarchy, transmission networks are often centralized, with individuals selectively learning from models that have a reputation of success within a network (Henrich & Broech, 2011). Individuals try to maintain a close proximity with learning models when they have a prosocial reputation and costs are relatively low for learners (Henrich & Gil-White, 2001; Henrich & Broesch, 2011). Social learning is formed by two stages: children initially learn information and behaviour from their parents (Vertical Transmission: Castro & Toro, 2004; Csibra & Gergely, 2006). Once this information is processed, individuals select models that have visible cues of prestige and pedagogy (Oblique Transmission: Tehrani & Collard, 2008; Henrich, 2004). Moreover, within cultural transmission networks (that were of evolutionary relevance) in Fijian villages, learning within the networks was centralized, with learning biases within and between domains based on perceived reputation for success and knowledge, indicating that individuals strategically and adaptively selected models (Henrich & Broesch, 2011). Furthermore, the relationship between cultural transmission, network centrality and perceived reputation is significant to the hierarchy literature. The networks that humans learn and operate in have a substantial impact on the way in which they behave and their rank. Moreover, the network effects of prestige and dominance as behavioural strategies provide a fruitful platform for future research within the field.

5

Predictions

Personality and Social Structure

Stemming from the work of Bott (1957), Burt (1992) and colleagues, it is posited that social structures affect group. As aforementioned, groups with higher levels of cohesion seem to be more productive (Coleman, 1990; Granovetter, 1985). However, within the hierarchy literature, dominant leaders have previously been observed as using a 'divide and conquer' technique to maintain their power (Case & Maner, 2014). The status, centrality and power vested in them through subordinate deference and proximity causes leaders to have an extensive impact on group structure, processes and performance (Keltner, Gruenfeld & Anderson, 2003). When the position within their network is threatened, leaders may attempt to increase the power gap between them and others, through monitoring beta individuals, derogation and ostracizing threats (Maner & Mead, 2010) to prevent any successful challenges (Mead & Maner, 2012; Tiedens et al., 2007). Moreover, the implementation of such acts is dependent on an individual's personality, with dominant individuals being more likely to utilize divide and conquer strategies for attaining and maintaining their position (Case & Maner, 2014). The experimental studies conducted by Case and Maner (2014) support the proposed argument, indicating that individuals high in dominance seek to exclude highly talented individuals or those who would create a challenge to their position. Yet Case and Maner (2014) fall short in fully explaining such process. Crucial evidence within the ethnographic and social network literature support and build upon these ideas about the hierarchical processes of power attainment and maintenance. Moreover, the 'divide and conquer' strategy is not as novel an idea as Case and Maner (2014) pose. A well-established literature within social networks had had a long history of testing these strategies (also referred to as an exclusion mechanism; Burt, 1984). The exclusion mechanism is successful when a node is the most connected within a group with a relatively large number of structural holes and can play other nodes against each other to meet their own egocentric goals. Moreover, the hypotheses in the current research attempt to marry this literature. Therefore, it is hypothesized that within social networks where dominant individuals are of high rank, larger amounts of structural holes will be present and, thus, there would be lesser in-group cohesion.

Evidence from the ethnographic record supports this theory, with a number of naturalistic examples of the divide and conquer technique being used by power-holders (Barth, 1959; Bailey, 1970; Barnes, 1954). Transactionalist theory outlines that in human groups, the behaviour and strategies of individuals moulds and maintains social constructs, such as kinship, politics and economics within a society (Barth, 1969). The actions and choices made by individuals are strategically deployed through the socio-ecological factors that govern and constrain individual action (Barth, 1969). Transactionalist research has described competitive strategies employed by individuals that ostracize and exclude individuals who are a threat to their social and economic power. For example, in a study of segmentary opposition and competition in Swat Valley, Barth (1959) outlines how Pathan

landlords use a divide and conquer strategy to attain or maintain their power and economic wealth. Firstly, Pathan landlords often attempt to poach productive farm workers from rival landlords, reducing their network size and influence (Barth, 1959). Secondly, during disputes over inheritance for land within the Pathan patrilineal descent system, brothers become competitors and attempt to marginalize their each other within the descent group to promote their claim to the land (Barth, 1959). Moreover, work within the field indicates that when individuals feel threatened they may attempt to manipulate the positions of competitors, forging strategic coalitions and limiting the reach and influence that their challengers have (Boissevain, 1974).

The Dominant Marginalize and the Marginalized become Dominant

At both an individual and group level, dominance may become increasingly utilized and accepted as a route to rank in human groups when there are high levels of perceived social exclusion and marginalization.

It seems that dominance within human groups is most successful when such groups and individuals perceive themselves as marginalized from wider society. Antisocial behaviours and rejection of wider social norms stem from disenchantment towards society. Such rejection is caused by a lack of strong reciprocity between groups and actors (Bowles & Gintis, 2001; Gintis, 2000; Fehr et al., 2002). Cooperative behaviour and norm acceptance manifests from repeated reciprocity, due to fear of withdrawal from future interactions (Hamilton & Axelrod, 1981; Trivers, 1971). However, this mechanism is not stable in all contexts (Boyd & Richerson, 1988) and if one actor or group does not reciprocate with another then the incentives for cooperation become limited. Thus, groups that are not accepted by wider society become insular; creating a marginalized subculture that is often perceived as delinquent (Cohen, 2002; Goldstein, 1991; Cohen, 1955; Wolfgang et al., 1967). For example, among criminal youth gangs in Guatemala the ultraviolent hierarchies based on fear were formed by economic frustrations and failed attempts for social change (Levenson, 2013). Adolescents join at a young age in attempts to promote their economic rank and attain their social and material goals, attaining and maintaining their power through non-verbal, cultural and physiological cues to dominance (such as tattoos, hypermuscularity: Levenson, 2013).

Individuals at the acme of social hierarchies direct and promote specific norms and values that are selective in their self-interest (Alexander, 1987). Thus, in line with this theory, dominant individuals perpetuate dominance hierarchies. An understanding of why certain individuals are more inclined to join delinquent groups can also be founded, as those possessing deficits in moral knowledge or negative perceptions of the social world may feel most comfortable within groups of like-minded individuals. Negative perceptions of the social world can be founded from an individual's experience.

As outlined previously, individuals often attempt to gain proximity to those who they deem similar to themselves (McPherson et al., 2001). This would explain why certain groups might be less able to attain rank through legitimate or prestigious routes. For example, businesses in America have been found to employ a small ratio of ethnic minorities compared to the majority ethnicity (Reskin et al., 1999). This may explain how gang membership is often delineated through race and ethnicity (Sampson & Raudenbush, 1997; Sampson & Wilson, 1995; Thornberry, 2003; Esbensen & Huizinga, 1993). If individuals are marginalised due to their attributes, such as ethnicity or social economic status, and are placed in environments where prestige does not provide social or material benefits; they often attain things through dominance (Sidanius & Pratto, 2001; Arnold, 1970; Cohen, 1955a, 1955b). These delinquent subcultures become normative to individuals and groups that are in this position (Short, 1968) and are common in areas that suffer from poverty (Ekpenyong & Lasisi, 2012). Instead of valuing academic intelligence, a respectable job and legal means of acquiring money, these groups often strive to be viewed as tough, aggressive and 'street smart' (Brotherton 1996; Miller et al. in Short 1968). Being 'street smart' can often supplement the marginalisation that individuals face in the labour market as well as in social life, providing some form of autonomy and allowing formation their own economic operations (Brotherton, 1996). Furthermore, this would explain why evidence suggests that individuals' predisposed to antisocial behaviour are more likely to join delinquent groups (Gordon et al., 2004), as they are most likely to succeed within such hierarchy. This is not to say that there are dominant or prestigious people, it is to say that behavioural traits possessed by individuals and socio-environmental factors, such as marginalisation, may influence which status acquisition strategy most appropriate to an individual's situation.

Dominance is often viewed as the most successful route to rank acquisition within and between delinquent and antisocial gang networks. Between networks, individuals and groups maintain their rank through the creation of fear (Sidanius & Prato, 2001; Chettleburgh, 2012) and the structure of such acts, such as murder, are moderated by the construction of gang networks and an individual's position within them (Papachristos, 2009). These groups often have a clear leader who is usually one of the older members, but leadership fluctuates and is at times unstable (Bloch & Niederhoffer, 1968). Leaders have control over the majority of resources available to the group and rely on those lower in the hierarchy to do their bidding and to remain loyal to them through fear (Bloch & Niederhoffer, 1968). For example, the militarized structure of the hierarchy present in the Nuestra familia and the self-defined goals imposed on members, denoted by the use of visual representation through tattoos, are antisocial in nature (Sanders 1988). The social hierarchy present in the Nuestra familia is in the dominion of a 'General' (Carter et al., 1985), with overarching power within the group. Below the 'General', there are ten 'Captains' ranked in descending order, with the highest ranking 'Captain' acting as the successor of the 'General' (Phelan & Hunt 1998). Lower in the social order are 'Lieutenants' and 'Soldiers', a soldier must have murdered at least three people to be eligible for

promotion to ‘Lieutenant’ (Carter et al. 1985). Delinquent groups are typically populated by young adult males; however there are females that partake in delinquent practices and female delinquent gangs (Brotherton 1996; Campbell 1992). Furthermore, within such groups, the social context promotes the dominance strategies outlined by Henrich & Gil-White (2001).

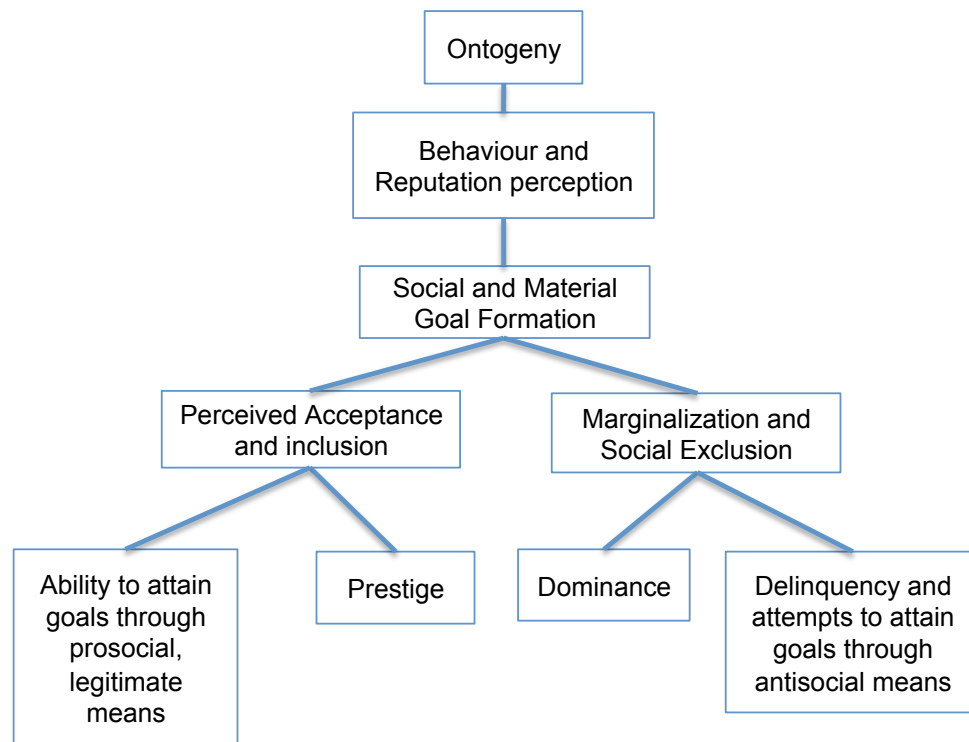


Figure 2: The relationship between marginalization and rank acquisition strategies

In sum, the two hypotheses provide viable explanations for why prestige is widely accepted in human groups, whilst dominance is of variable success. Moreover, these propositions highlight a fruitful direction for future research into the social processes that govern the implementation and success of behavioural strategies.

Questions and Predictions

RQ1: Do prestige-dominance scales predict influence in a naturalistic setting?

The prestige-dominance scaled questionnaires initially constructed by Buttermore and Kirkpatrick (Unpublished Manuscript; Cheng et al. 2010 validated these scales) assess the rank and influence of an individual. Over recent years these scales have gained a great deal of support within social psychology and have been directly developed from the prestige-dominance model proposed by Henrich & Gil-White (2001). However, these questionnaires have yet to be tested in a naturalistic

environment, as all works produced using the scales have been in an experimental setting (Cheng et al., 2010; Cheng et al., 2013). Evidence has suggested that other scales of behaviour and influence, such as the Big Five, have predictive implications for ecological behaviour at a trait level and thus robustly predict observable behaviours in a naturalistic setting (Mehl et al., 2006; Borkenau et al., 2004; but see also Gurven et al. 2013). Nonetheless, there has been no such testing of the prestige-dominance scales. It is therefore important to test the scales in diverse cross-cultural settings to further understand the ‘real-life’ consequences of the traits.

Moreover, it is further imperative to test the generalizability of the scales in settings that are not W.E.I.R.D. (Western, Educated, Industrial, Rich and Democratic: Henrich et al., 2010). As the scales were developed using and tested on samples of North American undergraduates there previously been no such testing. Evidence suggests that there is considerable variability between geographical populations, especially between W.E.I.R.D. and non-W.E.I.R.D. samples, suggesting that they may not be particularly representative samples of the human species as a whole (Henrich et al., 2010a). Thus, the results found using undergraduate population from North America may not be mirrored in different populations. The current research population is not typically W.E.I.R.D. Romania is one of the poorest developing countries in Europe (EFA Global Monitoring Report, 2011; UNICEF: Romania) and, although it is becoming increasingly westernized, Romania would not be deemed as Western (Bibu et al., 2009; Condruz-Băcescu, 2009). Though the current study is the first to test the prestige-dominance scales naturalistically and in a non-W.E.I.R.D population, it is limited in size and demography. The study’s main focus is not to fully answer these questions, as time pressures will not allow it, but to provide the first evidence in support of the scales in a naturalistic setting and lay the foundations for future studies.

RQ2: Does age moderate dominance and prestige in an adolescent hierarchy?

Within early childhood to early-mid adolescence dominance has been observed as fitness enhancing, influencing resource attainment, social rank and attractiveness as a social partner (especially for males: Hawley, 1999; Pellegrini et al., 1999; Savin-Williams, 1980). However, by late adolescence and early adulthood, dominance seems to become maladaptive, dysfunctional and associated with psychopathology, whilst prestige increasingly promotes rank and fitness (Tremblay et al., 2004; Dodge & Albert, 2012; Savin-Williams, 1980; Eisenberg et al., 1987; Eisenberg et al., 2006; Pellegrini et al., 2007). Yet results have been contradictory and confusing, with some indicating that dominance declines in success, whilst others show the persistence of dominance (Hawley, 2014). Within evolutionary developmental psychology there has been a recent urge to shift to the latter

perspective. As with Henrich and Gil-White's model of rank attainment (2001), Hawley argues that throughout development individuals may still attain and maintain rank through dominance, with aggression and coercion having the same functions as prosocial behaviour (Hawley, 2014; Hawley & Geldhof, 2012). Therefore, it is predicted that within an adolescent hierarchy, individuals may still attain rank through dominance. It is further predicted that, as both prestige and dominance are forms of embodied capital, they will both increase with age. Older individuals will have physically stronger and larger in size, which is associated with both prestige and dominance.

RQ3: Does self-perceived social marginalization predict dominance and have a negative relationship with prestige?

As previously outlined, individual's who feel more marginalized by the wider society, and therefore have limited means of attaining rank through prestige, will be higher in dominance.

RQ4: What effects do prestige and dominance have on social networks?

Does dominance foster lesser structural cohesion?

In light of the aforementioned hypotheses, it is predicted that in networks that have dominants in high-ranking positions there will be more structural holes.

Are prestige and dominance related to centrality in cooperation, friendship and resource control networks?

As outlined in the previous sections, prestige and dominance should have effects on an individual's position in a network. It is predicted that both prestige and dominance will promote centrality in a friendship network. However, each behavioural strategy may have different effects. As the literature suggests, high prestige should promote an individual's centrality in cooperation networks and should afford some centrality in resource control. On the other hand, it is predicted that dominance should have a negative effect on centrality in cooperation networks, but a strong, positive relation to resource control.

6

Ethnographic Setting

The current section is an overview of the ethnographic setting and the relevant socio-political issues surrounding the current research population. Both studies within the current research were located in a rural town in Harghita Region, Transylvania. Although the relevant literature has been sourced extensively, it only covers what has been written in English. Moreover, this limits the current section, as a great deal of the history and social issues surrounding the local area has been written and taught in Hungarian or Romanian. Therefore, the current section provides important social insights into the current research population, yet is limited in its scope.

The Current Population

The current research population were children and young adults who took part in an annual summer camp in Harghita Region, Romania. All participants were social orphans. Overall there were 22 participants and 81.8% of participants were ethnic roma (*Cigáni*). The average age of participants was 15 and 27.3% of participants were female. All participants spoke Transylvanian Hungarian and Romanian fluently as a second language.

Over the recent years social orphans in Romania have been increasingly integrated into the wider society. Therefore, throughout their childhood, the current population were schooled with all other children in the area in the Romanian state schooling system. Although there has been attempted nation-wide integration of social orphans and roma-gypsies, tensions are still high and ethnic Roma are still often ostracised in the classroom (this is also the case in Hungary: Boda & Neray, 2015; Boda et al., *in prep*). The current population live in ‘family cells’, in the apartment blocks and purpose-built houses in the area. Each summer Romanian social services, in conjunction with a number of NGOs and international charities, organize a summer camp, where participants usually live for a month and learn a number of skills (such as English) from international volunteers.

Transylvania

Contemporary Transylvania is a culturally ambiguous area that has lost its national identity through historical political conflicts, forming a distinct hybridized culture. The people of Transylvania do not associate as Romanian, nor true Hungarian, describing themselves as Transylvanian Hungarian. Magyar (Hungarian) is widely spoken in Transylvania and the culture (cuisine, folk traditions, festivals, etc.) is still prevalent, but is, however, diluted by a number of Romanian customs (White, 1999). In the 2014 census, only 6.1% of individuals affiliated themselves as Hungarian, with only 6.3% of the country speaking Magyar (CIA World Factbook). These figures are not surprising, as

communist policies during Ceasescu's government aimed to create a single identity (similar to that of Stalinism in the USSR), migrating a large proportion of the population from southeastern Romania to Transylvania in an effort to acculturate the people and further persecuted ethnic minorities (Tismaneanu, 1993; Behr et al., 1991; Verdery, 1991). All individuals in Romania have to associate as Romanian nationals, regardless of their personal identity, and must be fluent in Romanian, which may account for the misrepresentative demographic figures within the census. Throughout Transylvania, Romanian is the second language of the people, Magyar is their native tongue, and the people only speak Romanian conversationally when it is essential. Furthermore, it is not surprising that Transylvania is referred to as a peripheral culture.

Politically and culturally, Transylvania has strong ties with Hungary. Both Hungary and Romania have been attempting to integrate Transylvania into their national identity, not through division of territories, but by claiming historic cultural centres (White, 1999). Romanian nationalists have attempted to legitimize their claim over Transylvania by maintaining that they are liberators from Hungarian oppression. This perspective maintains that the Transylvanians were originally Romanian, linking archaeological centres of significance during the Roman occupation of Transylvania with their nation. For example, statues of Romulus and Remus are located in nearly every town and are central to Romanian history (White, 1999). However, historical and archaeological evidence supporting such claims are lacking. Rather, it seems that Romanian nationals in Transylvania have historically been attempting political and social equality, not unification of Transylvania with Romania (Hitchins, 1969). Alike to Romanian nationalists, Hungarians have attempted to stake their claim over Transylvania, making somewhat loose historical ties to the area. Historically, a number of important Hungarian scholars, leaders, families and monuments have hailed from Transylvania (White, 1999). Hungarian folk traditions are also more closely related to those observed in Transylvania, with a number of traditions originating from Torda, Zilah and other areas in Transylvania (these traditions are referred to as being 'true Hungarian' by nationalists: White, 1999). Nonetheless, these claims have a weak base, with many individuals in Transylvania refuting claims that they are Hungarian or Romanian, and distinct cultural customs and norms (such as gender roles (Gal & Kligman, 2000; Ellis, 2009; Eglitis, 2000), leading scholars to perceive Transylvania as culturally autonomous (White, 1999). The hybrid nature of Transylvanian society has caused many within the population to associate as Szeklers (settlers). The Szeklesky were a nomadic Magyar tribe based around the Carpathian Basin that, although assimilated into the Hungarian Kingdom, maintained a distinct culture that is still nested within wider, contemporary Transylvania (White, 1999). For example, folk festivals in many regions, particularly Harghita Region and Targu-Mures, are a celebration of Szeklesky customs; with many stalls selling heavily embroidered traditional Szeklesky dress and also tapestry, pottery, foods (i.e. Langos). Szekler dress is also worn and folk dance is performed during

important ceremonies, such as school and university graduation and town festivals. Moreover, contemporary Transylvania seems to have greater historic ties to Szekler culture than any other.

Due to the disputes over Transylvania, the area has seen a great deal of conflict between Hungarian and Romanian nationals over the past decades. During Ceausescu's government nationalist policies fuelled inter-ethnic abhorrence that has persisted in a somewhat diluted form (Behr et al., 1991; Tismaneanu, 1993). It is not surprising, that during and after the fall of Ceausescu in the early 1990's, there were a number of clashes between Hungarian and Romanian nationals. In 1990, alike to the events of the Hungarian-Romanian conflict of 1940, Hungarian nationals demonstrating their ambivalence towards the Romanian state in Targu-Mures began defacing Romanian monuments, which quickly escalated into the violent clashes (referred to as 'Black March'), and resulted in six fatalities and three hundred injuries (Segesten, 2011; Roe, 2002). Such feeling has not disappeared, with many Hungarian nationals still urging for Transylvania's political and social autonomy, threatening state security (Roe, 2002). Moreover, in contemporary cities of Transylvania, districts are still ethnically divided and Universities are either Hungarian or Romanian speaking (White, 1999). These divisions are not arbitrary, the post-communist government has maintained an effort for ethnic cohesion and integration. Yet the people are still divided, opting to live near to those who identify on similar grounds to themselves. Furthermore, in the recent years, such conflict has not arisen between Hungarian and Romanian nationals, but the sentiment still remains.

Ethnicity

The greatest conflict within contemporary Romania is that surrounding the Roma Gypsy (*Cigáni*) population. Within the current research, the majority of participants associate as *Cigáni* ethnics and the treatment of ethnic *Cigáni* historically and within the wider society reflects the treatment that the participants have faced throughout their lives. Historically the *Cigáni* have been viewed as a marginal community, persecuted by dominant ethnic groups throughout Europe (Puxon & Kenrick, 1972; Georghe, 1991). Following the Romanian Holocaust (*Porrajmos*) during World War Two, the gypsy population of the area has decreased significantly (Loanid, 2008). However, the *Cigáni* remain prominent in Romanian society, being the third largest ethnic group (3.1%) in the 2014 Census (CIA Factbook). It should be noted that this figure is disputed, with many believing it to be underestimated, and stating that the actual figure is closer to 10% of the population (Chryssochoou & Marcu, 2005). History has not changed the prejudice that the *Cigáni* face in contemporary Romania. In a number of geographical and social arenas throughout Romania and Transylvania the gypsy population are not accepted or allowed. This social alienation is not legally, or necessarily political, accepted; yet

prevails in the local communities and has, at times, escalated into violent conflict. In the 1991 report on Human Rights in Romania, Joseph Voyame explained:

“The authorities, like the majority of the population, tend to regard the gypsy community...as deviant and criminally inclined and tolerate and even encourage expressions of hostility toward them”

(Gheorghe, 1991: 831)

The marginalization of *Cigáni* people throughout the twentieth century may account for the high levels of deviance and antisociality towards non-gypsies. It seems that being born *Cigáni* in Romania limits the possibilities for social and economic success, causing many to attempt to gain success through means that are not socially accepted. For example, there was an unspoken rule that gypsies were not allowed to attend university, with the figures given by Romanian social services supporting this as, on average, only 2.5% of the children attend university each year. The *Cigáni* population in Central and Eastern Europe are one of the most vulnerable minority groups. Whilst there have been a number of attempts to aid in the inclusion, health and employment of the *Cigáni* communities, there is still incredibly large inequality between the Roma and dominant ethnicities in the area. For example, evidence suggests that up to 71% of *Cigáni* households are in deep poverty, with the probability of *Cigáni* children graduating high school being 29% and, due to ethnic discrimination, less than half of the population are unemployed (World Bank, 2015).

The nomadic *Cigáni* lifestyle has caused many dominant ethnic groups to view them as ‘outsiders’ and has further isolated them as a people. The *Cigáni* lifestyle has traditionally been that of a nomad, with males offering services (such as musical shows, cleaning, handiwork, metalwork and agricultural aid) and females selling traditional, handmade trinkets (i.e. pottery, embroidery) to the communities that they pass through in return for either food or money (Acton & Mundy, 1997). Generally, the *Cigáni* attempt to capitalize on such transactions, regardless of pricing norms of the area, leading many non-gypsies to perceive them as dishonest (McLaughlin, 1980). Groups are less likely to cooperate or trust those that they perceive as different or as being in a competing group (Bowles & Gintis, 2001; Tajfel & Turner, 1979; McDonald et al., 2011) or with individuals that have weak or no network ties within their group (Nelson, 1989). Thus, there is distrust between both groups and, at times, conflict, as a policy of non-communication with non-*Cigáni* also lies within *Cigáni* groups. Gypsy communities have recently become more sedentised within Romania, with Gypsy ‘ghettos’ (or ‘encampments’) emerging outside of towns, villages, and within cities (Trandafoiu, 2003; Crowe, 1999; Barany, 1990). Within these geographically isolated areas living conditions are extremely poor, with no running water, no sanitary washing facilities, no access to electricity and very little access to food. Although there have been attempts to assimilate the *Cigáni* into wider society (Hann, 2002),

there are still serious social issues surrounding *Cigáni* literacy (Casa-Nova, 2006), employment (Crowe, 1999) and health (Masseria & Mladovsky, 2010). However, *Cigáni* position within Romanian society is dependent on which tribe, family, and area that they hail from.

Types of Roma

Within Harghita Region, there are few *Cigáni* that maintain a fully nomadic lifestyle, however, many traditional *Cigáni* customs have persisted.

Traditional Roma (*Lăutari*)

The *Lăutari* gypsies have maintained the most traditional gypsy lifestyle. *Lăutari* is a term describing a musical tradition that has been culturally significant in Romania since the fourteenth century, of which this type of gypsy performs as a service to generate an income (Beissinger, 2001). The *Lăutari* are the most successful and accepted gypsy in the area, being admired by non-gypsies for their skill and being relatively affluent within the local population. In an occupational sense, only males can be *Lăutari*, females may accompany *Lăutari* and if performing are referred to as *cântărețe* (Beissinger, 2001).

The House Mafia (*Clanuri Cigáni*)

The second category of gypsy strives for economic success through deviant and illegal means. Their businesses often revolve around drug dealing, the sex trade and most notably loan sharking. Members of these gangs will often reside in local bars, offering money to those who are alcohol dependent (a chronic population in Romania, with two million people estimated to be alcohol dependent: ALIAT Report, 2014). In return those who are loaned money with extortionate interest rates, sign the legal rights to their house if repayments are not made. Through their trades and political connections, these 'illegally rich' have the resources to fulfil western, capitalist ideals, owning a great deal of property, wearing expensive western clothing and having a lifestyle of relative luxury in comparison to their neighbours (Trandafoiu, 2003). Furthermore, due to the systematic prejudice that the gypsy population face within Romania, it is not surprising that *Clanuri Cigáni* gangs have grown and persisted within the population.

The Underclass

Unlike other types of Gypsies, the underclass are not successful, nor are they partially integrated into wider society. The underclass live in gypsy encampments that are geographically isolated. Individuals usually travel to the towns in the mornings to offer cleaning services (or ‘cheap labour’ for limited financial returns or food (Stewart, 2002)) or beg for food. Due to the poor living conditions, the majority of the participants in the current study are from this gypsy class, with many of them being taken by the state to provide ‘acceptable’ living conditions.

Romania and the Social Orphan

During communist governance many political factors critically affected the treatment and position of children in state care. Due to Ceausecu’s pro-natalist social policies, the overall birth rate increased to such a degree that families were unable to support their children (Keil & Andreescu, 1999; Soare, 2013). The number of children in state care increased considerably, with over sixty-five thousand children placed in orphanages during the period (Ames & Carter, 1992). The majority of those in state care were social orphans, forcibly taken by the state, abandoned or given voluntarily to the state by parents (Kligman, 1998, 226). It was the belief of many parents that the state could take better care of the children than they could, a mentality that still remains evident among the poor in contemporary Romania (Collins Sullivan, 2012). However, state funding of institutions and orphanages was not enough to provide adequate care and, following the overhaul of Ceausecu in 1989, it became public knowledge about the extreme deprivation that those in care were living in (Ward, 2011; Dunlop, 2013). Throughout this period child neglect and abuse were chronic societal problems and the impact of such treatment caused those in care to develop a number of distinctive emotional and behavioural patterns (see Chugani et al., 2001; Chrisholm, 1998). The ratio of children to carers was extremely high, with some during the period stating that each carer was responsible for around twenty-five to thirty children (aged between 1 and 16: Ward 2011, 136). The conditions quoted in media coverage, such as food and clothing shortages, overcrowding and violence between children were of some truth (Ward, 2011, 137). In the years subsequent to Ceausecu being overthrown, a large number of lasting changes were made to the state welfare system. The ratio of carers to children dramatically increased and adequate funding was put in place to provide many daily necessities (Simon et al., 2011).

The fundamental issues that children in state care today face seem not to be solely institutional, but also social. Those in the care of the state are not allowed to attend certain events, or go into certain buildings within the town. A number of the more expensive businesses often refuse to serve social orphans and ethnic *Cigáni*. There are a number of cultural factors that account for the difficulty that those in state care face when interacting with the wider Romanian society (Dolding, 2013). Ceausescu cultivated the view that orphans were ‘social problems’, a sentiment that is still somewhat strong

within the wider population of Hungarians and Romanians (Dumling, 2004). Due to the conditions faced, many children and young adults in state care developed mental illnesses and were subsequently deemed by Ceausescu as being ‘unproductive’ and were therefore marginalised geographically and socially from the wider society (Kligman, 1998). The lack of knowledge and cultural understanding of mental illness seems to have persisted in contemporary Romania. As there are a disproportionate amount of *Cigáni* children in state care, most face the stigma and discrimination that has resulted from the fraught relationship between the ethnic *Cigáni* and white Romanian population in Romania (Liegeois & Gheorghe, 1995; Carter, 2001; Cretan & Turnock 2009; Romocea, 2004).

The Contemporary Care System

Over recent decades following the fall of Ceausescu, governmental policies have attempted to aid children in state care and further integrate them into the wider society. Although the success of these changes has been largely questioned (Dumling, 2004), the current conditions that children in state care live have improved dramatically (Simona et al., 2011). Those in state care now have good living conditions, with running water, electricity and adequate food provisions. Social services have also purchased a number of apartments in towns and there are newly constructed houses that were funded by NGOs and charities.

Being social orphans, the majority of participants knew their parents and have infrequent contact with them. The economic and social situation in Romania has meant that a lot of the participants were taken by the state from the neighbouring gypsy ghettos due to the poor living conditions and, in some cases, due to neglect and abuse.

Family Cells and Kinship

The structures in which the participants live attempt to replicate the kinship structures of wider society and have produced fictive kinship within the group. The participants live in ‘family cells’ of between six and ten children and have two main carers who work on a rotational basis. These family cells usually comprise of two or three individuals between the ages of sixteen and nineteen, who act as secondary carers (or older brothers or sisters) for the younger counterparts. There are two or three individuals between the ages twelve to fifteen and the remainder of individuals are usually below the age of thirteen.

The relationship between the children and carers can be seen as a form of the fictive kinship described by Freed (1963). Children in care would often refer to each other and to care-givers through kinship terminology and the apparent formation of consanguinial bonds between unrelated individuals

(Dolding, 2013). As the carers are usually the older generations, they have worked with the children throughout the majority of their lives, performing parenting tasks and being their role models. The carers act as the participant's primary socializing agents, advising them on their behaviours and pushing their educational attainment. However, the carers are stretched. The participants do not always listen and the carers often get ignored. It seems that the individuals listen more to their peers than their carers, often emulating their behaviour and valuing their advice over that of others.

Individuals remain in state care until the age of eighteen. If the individual has passed their exams at this age and go to university, they will remain in care. However, if they fail their examinations, they cannot remain in the system and are given start-up money to help them begin a life outside of state care. There are charities in Romania to help individuals who have left the care system, yet resources are scarce and many individuals ultimately leave the care system with very little support. Due to the lack of support and opportunities individuals from state care often fall into illegal pathways to attain resources, working for the *Clanuri Cigáni*. It is no surprise that this may happen within the current research population, as the social issues surrounding their ethnicity and social position have made it extremely hard for them to gain meaningful and legitimate employment. Moreover, due to this social context, the current population is well suited for the current research design, as they are a marginal population that have shown signs of behavioural traits that are uncommon and are not accepted within the wider society. The population and area in focus is ripe for further research, not only in regards to behaviour, but also kinship and ethnicity.

7

The Current Research

Study 1: Which Way to the Top? The effects of Prestige and Dominance within a Developmental Hierarchy.

Participants

22 participants (27.3% Female, Average Age = 15, Age Range = 5-18) were recruited at a summer camp programme in rural Transylvania. At the beginning of the summer camp, the researcher presented a brief outline of the study and obtained verbal consent from participants. All participants were children and young adults under the protection of Romanian Social Services. 81.8% of participants were ethnic *Cigani*, the remaining 18.2% of participants were Transylvanian Hungarian. All participants were previously acquainted with each other. Participation in the study was voluntary, there was no compensation and participants were informed that they could leave the study at any point if they so willed.

The researcher was familiar to all participants; having intermittently been in contact with the participants over the period of four years following a volunteering project in 2011. The researcher had a closer relationship to a number of participants, as they comprised the ‘host family’ in which the researcher ate with and spent extra time with in the evenings following summer camp. The researcher does not believe that the difference in relationship had any significant impact of the results.

Measures

Participants were measured on their self- and peer-perceived Prestige and Dominance using translated, validated Prestige and Dominance scaled questionnaires (Buttermore & Kirkpatrick, *unpublished manuscript*; Cheng *et al.*, 2010). Self- and peer-perceived influence was measured using translated perceived influence scales (Cheng *et al.*, 2013). Four scaled items measured self-perceived marginalization. Item 1 (“*I feel that I have a good opportunity to go to university and further my education*”) addressed educational marginalization on the individuals, of which evidence suggests is extremely important for the development of delinquent behaviours that are often associated with dominance (Cohen, 1955a; Cloward & Ohlin, 2013). Item 2 (“*There are opportunities for me to gain meaningful employment once I have left school and state care*”) addressed economic marginalization and the ability an individual feels that they have in reaching their culturally perceived goals. There would be a negative relationship between Item 2 and marginalization (Cloward & Ohlin, 2013; Cohen, 1955a). Item 3 (“*I have a good relationship with individuals outside of my social group*”), measures an individual’s self-perceived social marginalization. This is an important measure, as individuals are most likely to act prosocially when there is a strong likelihood of repeated relations

and cooperation from the other actors. Item 4 (“*I am invited and feel comfortable attending large cultural events (i.e. town festivals, film showings)*”), addressing cultural marginalization. All items were translated into Hungarian and reverse scored.

Procedure

The researcher conducted ethnographic fieldwork over the period of a month. During this time the researcher took part in the general pastoral and recreational activities in the summer camp and conducted informal interviews with a number of participants. Following the period of ethnographic fieldwork participants were asked to complete Prestige and Dominance scaled questionnaires (Cheng et al., 2010) and measures of perceived influence (Cheng et al., 2013). For all questionnaires, scales ranged from 1 (*not at all*) to 7 (*very much*). Questionnaires were round robin, meaning that participants self-rated and peer-rated Prestige, Dominance and perceived influence for all other participants. Therefore, all participants had a total of 21 peer ratings of Prestige, Dominance and perceived influence. Participants completed their own responses with a carer, translator and the researcher present to answer any questions. All questionnaires were completed by hand by the participant and later anonymised and entered into a database by the researcher.

Results

Initially, participants’ round robin Prestige, Dominance and perceived influence scores were computed using SOREMO (Kenny, 1998), implementing the Social Relations Model (SRM: Kenny & La Voie, 1984). The SRM provided the most robust, as it accounts for all basic questions of interpersonal perception (Laing et al., 1966) both theoretically and statistically. Responses were partitioned by the SRM into three components: perceiver, target and relationship. For this study the interest was on the target effects and target variance. Target effects are the average of all perceiver’s ratings of a specific target. Target variance is used to measure consensus between perceiver nominations and indicates the amount of variance between perceiver ratings due to the target. By using the SRM, the perceiver and relationship biases that could skew self- and peer-ratings (Kenny et al., 2006) were removed.

Table 1

Descriptive statistics and correlations among dominance, prestige, perceived influence and likability.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Dominance	4.00	3.52	-	-	-	-	-
2. Prestige	4.37	0.93	-.437*	-	-	-	-
3. Age	15	3.52	.164	.378	-	-	-
4. Perceived influence	4.11	1.26	.451*	.509*	.725**	-	-
5. Likability	4.73	1.08	-.765**	.864**	.001	.090	-

Note. *N* = 22.

* $p < 0.05$.

** $p < 0.001$.

Primary analyses on the four-item measures of self-perceived marginalization indicated that the data was normally distributed and was a relatively reliable measure. The Kaiser-Meyer Olkin (KMO) test indicated that the four items had mediocre reliability (.415). However, taking into account the small sample size, the items were relatively close to being acceptable (point of acceptability is when the measure account for 0.5 of variance). Secondary reliability analyses were performed and Bartlett's test of Sphericity indicated that the four items were significant ($p = .035$) and should not be rejected. Furthermore, the four items were not rejected and were cautiously included in the analyses. It is noted that if further research is to be conducted, it is recommended that a scale should be constructed and validated using confirmatory factor analysis.

Preliminary Analyses

A number of tests were performed to ensure that all predictor and dependent variables fit the assumptions of regression. Ordinal predictor variables were coded for regression, with sex being coded as 0 = female, 1 = males and ethnicity coded as 0 = Hungarian and 1 = *Cigani*. All variables were normally distributed, there was no significant multicollinearity, however there was small homoscedasticity.

A step-wise multiple linear regression was initially conducted to determine which of the theoretically relevant variables were significant predictors of perceived influence. Both input models within the regression were found to be significant (Model 1: $F(4,17) = 8.441$, $p = .0001$ and an adjusted R^2 of .665; Model 2: $F(6, 15) = 16.374$, $p > .001$, with an adjusted R^2 of .815). The predictive weight

changed significantly between models (R^2 change = .202, F change = 11.461, p = .001). The results of the step-wise multiple linear regressions indicated that in model 1 likability and ethnicity had small non-significant effect sizes (B = .003, B = -.133, p = >.05, respectively), whilst age (B = .609, p = .001) and sex (B = 0.364, p = .022) were significant predictors. However, once Prestige and Dominance scores were included in model 2, the effect sizes of age and sex failed to be close to significant. Prestige (B = 0.743, p = .047) and Dominance (B = .575, p = .17) were the only predictor variables shown to have large, significant effect sizes, of which is especially interesting considering the small sample size.

To assess whether marginalization significantly predicted Prestige and Dominance, a further step-wise multiple linear regression were conducted. Predictor variables (marginalization, ethnicity, age, sex) were standardized and entered into two separate multiple regression models with Prestige and later Dominance as the dependent variable. Only input model 3 for Prestige reached significance when including marginalization (Model 3: F (4, 17) = 4.554, p = .011, with an adjusted R^2 of .404). Ethnicity had a small, non-significant negative effect on prestige (B = -.283, p > .05). Sex and age had small effects and were not close to significant (sex: B = .176, p > .05; age: B = .340, p > .05). Marginalization had a negative, significant medium-sized effect on Prestige (B = -.525, p = 0.008). Again, only input model 3 of the step-wise multiple regressions were significantly predictive (Model 3: F (4, 17) = 8.649, p = .001, with an adjusted R^2 of .593). Antithetic to Prestige, ethnicity had a small positive, non-significant effect on Dominance (B = .192, p > .05). Sex and age also had small, non-significant positive effects on Dominance (sex: B = .252, p > .05; age: B = .189, p > .05). Marginalization had a positive, significant large effect on Dominance (B = .759, p < .001).

In light of the results of the step-wise multiple linear regression, all non-significant predictor variables were removed from the hypothesis tests, except for age. Age was included in the hypothesis tests, as it was believed to be a moderator of the relationship between both Prestige and Dominance with perceived influence.

Hypothesis Tests

To test *Prediction 1 and Prediction 2*, a moderated multiple regression (MMR: Aiken et al., 1991), assessing interactions, was performed using Hayes Process Macro on SPSS (Preacher & Hayes, 2008). The MMR was modelled by initially inputting perceived influence as the dependent variable, Dominance as the independent predictor variable, age as the M variable and Prestige as a covariate into a moderated regression. A second moderated regression was conducted with Prestige being the independent predictor variable and Dominance as the covariate; all other variables were included in the same positions within the model. As the sample size was small, bootstrapping was used to

provide a more representative statistical sample of the population in question (Hayes, 2015). Bootstrapping is a non-parametric approach to effect-size estimation and hypothesis testing. Within the parameters of the current data set ($n=22$), 10,000 samples were ‘bootstrapped’ to more powerfully compute the interactions between and effects of Dominance, Prestige, age and perceived influence. The overall model was highly significant ($F(39.5662, 17)$, $p < .001$, with an R^2 of 0.950). Both prestige and dominance significantly predicted perceived influence (Prestige: $B = 1.091$, $p < .001$; Dominance: $B = 0.833$, $p < .001$). Moreover, there was a significant interaction between age and dominance (low Dominance: $t = 2.841$, $f^2 = .493$, $p = .011$; high Dominance: $t = 7.0337$, $f^2 = 1.1742$, $p < .001$) and also between age and Prestige (low Prestige: $t = 2.6713$, $f^2 = .6252$, $p = .016$; high Prestige: $t = 5.323$, $f^2 = 1.4254$, $p = .0001$). Due to the incredibly high effect coefficients, it is believed that age is not only a moderator of Prestige and Dominance, but also had positive suppression effects. Suppressors increase the value of both R^2 and certain coefficients, thus boosting the predictive value of the equation (Horst, 1941: for an in depth example see Paulhus et al., 2004).

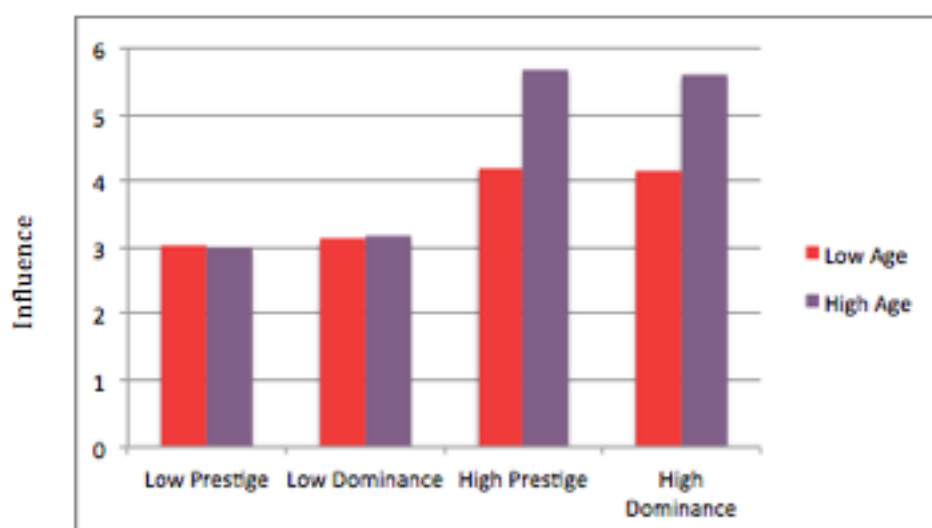


Figure 3: The moderation effects that age has on the relationships that Prestige and Dominance have with perceived influence.

To further decompose the effect that the variables had on perceived influence and to address Prediction 3, path analysis was performed. Path analysis is a causal structural equation modelling technique used to examine how the intercorrelations between variables fit the theory being tested. To initially conduct path analysis, a theoretical path diagram was constructed. The model was constructed by inputting the dependent variable, perceived influence, and drawing pathways to

theorized predictor variables (prestige, dominance and age) to measure the direct effect that they have on the dependant variable. Following this, theorized direct effect parameters were drawn between age with both Prestige and Dominance to measure the indirect effects that it may have on the influence. Finally direct relationship parameters were drawn between self-perceived marginalization and both Prestige and Dominance. Only marginalization and age were included as exogenous variables within the model, as other variables were not significantly predictive of Prestige and Dominance during preliminary analyses. All parameters within the model were specified as free and were standardized. As preliminary analyses indicate, all assumptions of structural equation modelling through multiple regression were met. The path coefficients produced by path analyses are analogous to and follow a similar interpretation to standardized regression coefficients from multiple regression analysis (Agresti & Finlay, 1997). Whilst there are similarities between path analysis and multiple regression, path analysis produces more complex, theoretically driven mediation analyses. However, results were interpreted cautiously as the desirable 20 to 1 ratio of number of subjects to parameters was not met, and, therefore, the estimates produced may not be stable.

Within the first model (Equation 1), perceived influence was regressed onto prestige, dominance and age ($F(3, 18) = 35.042, p < .001, R^2 = .854$). Within the second model (Equation 2) prestige was subsequently regressed onto age and marginalization ($F(2, 19) = 7.025, p = .005, R^2 = .425$). Following this, in the third model (Equation 3), dominance was regressed onto age and marginalization ($F(2, 19) = 12.906, p < .001, R^2 = .576$). The path coefficients for the full model are shown in Figure 4 and the direct and indirect effects of all variables are summarized in Table 2. The three multiple regression models that comprise the full path model were formally expressed by the following equations:

$$\text{Equation 1: } Y_1 = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \varepsilon_1$$

$$\text{Equation 2: } Y_2 = \alpha + \beta_4\chi_3 + \beta_5\chi_4 + \varepsilon_2$$

$$\text{Equation 2: } Y_3 = \alpha + \beta_6\chi_3 + \beta_5\chi_4 + \varepsilon_3$$

Y_1 = Perceived Influence

Y_2 = Prestige

$Y_3 = \text{Dominance}$

$\alpha = \text{Constant}$

$\chi_1 = \text{Prestige}$

$\chi_2 = \text{Dominance}$

$\chi_3 = \text{Age}$

$\chi_4 = \text{Marginalization}$

$\varepsilon\eta - \eta = 1 \sim 3$, standard error term

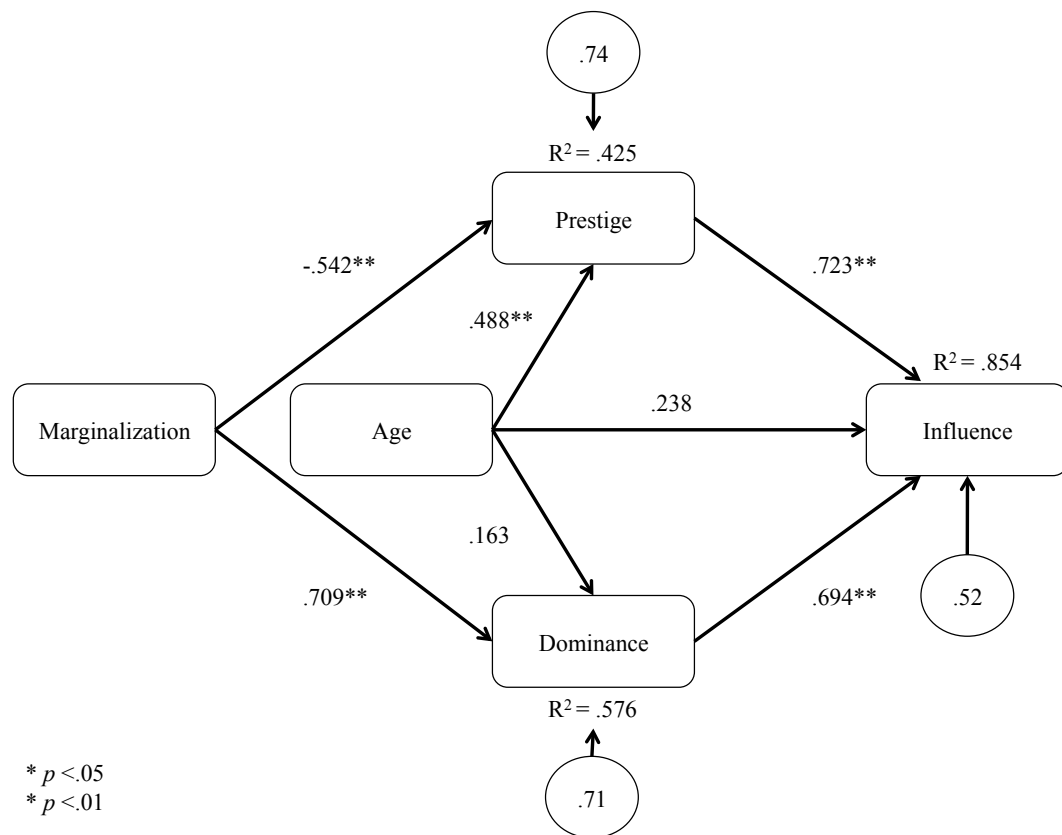


Figure 4: Full path model summarizing the effects of all theoretically relevant variables on prestige, dominance and perceived influence.

The causal and non-causal effects of all predictor variables were then calculated. The total association between prestige and influence was first determined. Initially, the spurious effect of prestige through age on influence was calculated. Following this, the unanalysed effect of prestige on influence through age its association with dominance was computed. The total association (total causal effect) of prestige with influence was calculated by summing its direct effect, spurious effect and unanalysed effect. The total non-causal effect of prestige was then calculated by subtracting the

total association of prestige from prestige's correlation with influence. To determine the total causal and non-causal effects of dominance on influence, the same calculations, with the respective coefficients were used. Moreover, to ascertain the causal, non-causal and indirect effects of age on influence were calculated. To do this, the indirect effect of age through prestige, and then dominance was computed. As with prestige and dominance, the non-causal effect of age was determined by subtracting its total association from its correlation with influence. The decomposed effects of all predictor variables on influence are summarised in table 3.

Table 2.

Summary of the effects of key variables within the path model.

Outcome	Determinant	Causal Effects		
		Direct	Indirect	Total
Prestige	Marginalization	-.542**	-	-.542**
	Age	.488**	-	.488**
Dominance	Marginalization	.709**	-	.709**
	Age	.163	-	.163
Perceived Influence	Prestige	.723**	.171	.894**
	Dominance	.694**	.095	.789**
	Age	.238	.465**	.703**

* $p < .05$

** $p < .01$

The total causal effects that Prestige had with perceived influence was extremely large and significant. The only significant causal effect for prestige was its direct effect on perceived influence. Whilst the association does seem incredibly large, it must be stressed that age seems to act as a suppressor for Prestige and, therefore, inflates its predictive value within regression models. The same pattern of causal effects was observed with dominance. Dominance had large, significant causal and direct effects on perceived influence within the model and, further, had a small, non-significant indirect effect. Age had a small, non-significant direct effect on perceived influence within the model. However, akin to results reported in the multiple moderated regression, age had a large, significant indirect effect through prestige and dominance on perceived influence and, therefore, had a large, significant total association. In regards to Prediction 3, results of the path analysis indicate that self-perceived marginalization had a large, significant negative direct effect on prestige and a large, significant positive direct effect on dominance. It is noted that other predictors of prestige, dominance and perceived influence may have been included in the model, however the model was kept as simple as possible due to the small sample size. It must also be noted that, although 'causal' has been used to

describe path coefficients, true causality cannot be attained using correlational data; thus when ‘causal’ is used it denotes causal inference.

Table 3.

Summary of the decomposed effects of key variables on perceived influence.

Variable	Correlation	Path Coefficient	Total Causal	Total Non-Causal
Prestige	.509*	.723**	.894**	-.385†
Dominance	.451*	.694**	.789**	-.338†
Age	.725**	.238	.703**	.022

† Negative non-causal effects are due to the suppression effect that age seems to have on prestige and dominance within the regression models.

* $p < .05$

** $p < .01$

Discussion

The Two ways to the Top

The current research makes valuable contribution to understanding the pathways to influence in human groups. As hypothesised, results of the current research provide naturalistic evidence, among a novel population, supporting the dual model of social hierarchy (Henrich & Gil-White, 2001), as both prestige and dominance predicted influence. Prestige had a slightly higher effect size in predicting perceived influence within the group than Dominance. This is aligned with predictions, as, cross-culturally, Prestige is more commonly accepted in human groups than Dominance and Dominance is only particularly feasible in specific contexts (Van Vugt, 2008). Notably, in the current context, dominance is a viable and distinct route to influence. Within the literature, debate ensues about the viability and nature of dominance. Previous evidence suggests that dominance is a form of competence signalling and that, without being perceived as competent; individuals with trait dominance do not attain influence (Anderson & Kilduff, 2009; see also Chapais, 2015). The current research fits into a growing body of evidence that emphasises the distinct nature of dominance (Cheng et al., 2013; Von Rueden et al., 2010). The dimensions measured by the current scales capture competence perceptions within a prestige subscale, whilst dimensions, such as aggression and coercion, comprise a subscale measuring dominance. In the current study prestige and dominance were highly negatively correlated, which indicated that the two processes were distinct and that

dominance was not related to perceived competence. Moreover, as dominance had a significant causal effect on influence, it may be inferred that individuals high in trait dominance were afforded rank due to fear and coercion, rather than perceived competence.

In keeping with recent evidence on social learning and social hierarchies among children and adolescents, prestige was the biggest predictor of influence within the current context. The age range of the group could explain this. When individual's age, acceptance of dominance falters and social partners are selected and deferred to peers whom are perceived as prosocial and prestigious (Pellegrini & Long, 2002). However, growing longitudinal evidence of friendship networks indicates that during adolescence antisocial, aggressive and norm-violating individuals are often selected as friends more over time (Rambaran et al., 2015; Laninga-Wijnen et al., in press). It seems that hierarchical processes do not fundamentally shift from processes of dominance to prestige as an individual ages. Rather, influence is driven by the immediate value of being associated with certain individuals (Parkhurst & Hopmeyer, 1998). Humans are highly reliant on social learning, as opposed to asocial learning, and strategically copy from conspecifics possess traits and knowledge that may be beneficial to the individual or group (Boyd & Richerson, 1985; Laland, 2004). Through this process, the conspecifics that are copied become prestigious social learning model and are granted high influence (Henrich & Gil-White, 2001; Henrich & McElreath, 2003). The current research provides evidence for this hierarchical process, alongside dominance, occurring in a developmental context. Results therefore support the notion that children have an innate predisposition to attend to and learn from others who attempt to cue and communicate relevant and beneficial information (Csibra & Gergely, 2009). These learning models are afforded influence and, through a quadratic effect, this influence begets a larger clientele of infocopiers. As prestige was noticeably the strongest predictor of influence, results further support the proposed relationship between prestige, social learning and influence among adolescents (Wood et al, 2015).

The current results also support recent advances in developmental psychology addressing aggression and dominance (Hawley, 2014). Human aggression and coercion is multi-dimensional in nature, with aggressive, dominant behaviours serving multiple functions (Little et al., 2003). Whilst the measurement used in the current research is different to those in developmental psychology, results suggest that, within the current context, dominant behaviours have an adaptive function. Akin to previous research (Hawley, 2003), individuals rated as highly aggressive and dominant were focal actors within the group, being rated as highly influential and, ultimately, of high rank. The current research supports the notion that in adolescent groups, individuals may act explicitly in their own self-interest, an action that may be damaging to the group, yet still be granted influence, deferred to and, moreover, become popular (Hawley, 2014; but see also Lansford et al., 2010). The current results emphasise that influence is not intrinsically tied to likability (Cillessen & Rose, 2005) and that,

especially among adolescent groups, individuals may become popular and influential through a mixture of prosocial and antisocial traits and behaviours (Huitsing & Veenstra, 2012).

Marginalization and Dominance

The current research implies that there is a strong relationship between self-perceived marginalization and dominance. As predicted individuals whom perceive themselves as marginal in a group-level, societal context are higher in trait dominance and thus, in the current context, become influential through antisocial means. Previous evidence has suggested that, when legitimate routes for attaining social and material goals are blocked, then such individuals may attempt to attain their goals through antisocial means (Cohen, 1955a). In the current context, participants were integrated into the wider society, but due to their personal attributes, they held low positions within wider society and, for the participants, it would be incredibly hard to obtain their social and material goals through legitimate routes. Participants were educated in local state schools and had contact with the wider society. This may have been where participants learned about the social and ethnic prejudices against them. As previously discussed, ethnic discrimination against the Roma in central and Eastern Europe is quite openly practised and has prevented many in the positions of the current research population from graduating high school and obtaining meaningful employment. As hypothesised, due to such widely accepted discrimination, legitimate routes to obtaining social and material goals were blocked, causing it to become more advantageous to learn how to be 'street smart' (Brotherton, 1996) and further behave more dominantly. Furthermore, this disposition towards dominance is also reflected by dominance being highly predictive of influence within the group.

Whilst the results of the current research shed light as to the relationship between marginalization and dominance, they are far from conclusive and must be interpreted cautiously. The current research population is small and may not be representative of the population of Cigáni in Romania. The measure of marginalization used, whilst being moderately reliable, failed to reach the acceptable measure of reliability. This could be due to the small sample size, as sample sizes of above three hundred participants are recommended. Moreover, the current research provides the first evidence of dominance being directly associated with perceived marginalization, but would be vastly improved by using validated measures on a larger sample.

In line with previous research (Flynn & Whiten, 2012), results further indicate that there may be an association between dominance, social learning and influence, as dominance was a significant predictor of influence. Social context is incredibly important in social hierarchy and individuals are often deemed important due to context-specific values that may not necessarily translate between groups, cultures or even classrooms (Hartrup, 1996). It has been previously shown that prior

experience during a ‘Sweep-Drawer Box’ task caused children to incorporate new strategies, omitting ineffective and irrelevant actions, which indicates flexibility in children’s learning strategies (Wood et al., 2015). Extending this, the current research suggests that, in a naturalistic setting, children and young adults may flexibly and strategically learn and utilize behavioural strategies to obtain their social goals. Specifically, results indicate that individuals who perceive themselves as marginalized from wider society are significantly higher in dominance (and significantly lower in prestige), which, in turn causes them to be higher in influence. This suggests that the socio-ecology surrounding an individual has important ontogenetic implications for the development of their personality and behaviour. Whilst this is not a novel idea, the association between an individual’s learnt behaviour and the way that associates to dominance is important and has implications in explaining the high levels of dominance and delinquency observed in a number of marginalized groups. The current research does not directly test the direct relationship between social learning and the tendency for marginalised individuals to become dominant, however the promising results provide a fruitful platform for future research to disentangle this association.

Age and Social Rank in a Developmental Context

As predicted, age moderated the effects of prestige and dominance on perceived influence. It is interesting that, in the current population, age did not have a significant direct effect on social rank. Previous evidence suggests that there is a bias for individuals to preferentially copy models older individuals, as they have more experience, in thus more competence, within in the environment (Wood et al., 2013). Complimentary to this, results suggest an interaction between prestige, dominance and age with regards to social rank. Specifically that older individuals, and therefore higher in prestige and dominance, were perceived as higher in social rank. In-keeping with predictions, these results provide evidence that prestige and dominance become more strongly expressed throughout ontogenetic development and that, rather than there simply being a bias to learn from older individuals, this bias is dependent on the qualities and characteristics of such older individuals.

Results further indicate that both prestige and dominance are a form of embodied capital. The physiological and behavioural traits that comprise Prestige and Dominance develop and strengthen over time and, in the current context, older individuals were more likely to express these cues. As inferred by the results, older individuals possessed higher levels of prestige and dominance and, thus, became more influential. Whether it is due to the instinct to copy older individuals and, therefore, afford those individuals higher influence, through physiological cues or through the context-specific selectivity of the certain personality trait is not conclusively determined. However, the current results indicate that children and young adults in the current context provide individuals high in either

prestige or dominance greater influence, indicating that both are forms of social and embodied capital. Developing and expressing physiological and personality traits associated with prestige and dominance can be costly, high-risk investments. However, in keeping with previous research assessing personality and embodied capital (Gurven et al., 2014), these traits strengthen more over time and it seems advantageous and optimal, while still considering the associated costs, for individuals to invest in both the physiological and personality traits. Furthermore, these results indicate that these traits seem to produce both individual level profits and also provide cues to the high value of an individual, producing social capital (Bourdieu, 1986).

Study 2: The effects of Prestige and Dominance on Network Position and Structure.

Participants

22 participants (27.3% Female, Average Age = 15, Age Range = 5-18) were recruited at a summer camp programme in rural Transylvania. At the beginning of the summer camp, the researcher presented a brief outline of the study and obtained verbal consent from participants. All participants were children and young adults under the protection of Romanian Social Services. 81.8% of participants were ethnic *Cigani*, the remaining 18.2% of participants were Transylvanian Hungarian. All participants were previously acquainted with each other. Participation in the study was voluntary, there was no compensation and participants were informed that they could leave the study at any point if they so willed.

Measures

Participants were measured on their self- and peer-perceived Prestige and Dominance using validated Prestige and Dominance scaled questionnaires (Buttermore & Kirkpatrick, *unpublished manuscript*; Cheng *et al.*, 2010). Self- and peer-perceived influence was measured using perceived social status scales (Cheng *et al.*, 2013). Multivariate networks were constructed using sociometric name generator questionnaires. Whilst the networks constructed may have been validated by coded ethnographic observations, they were excluded from the analyses due to time constraints.

Procedure

The current study followed the same protocol as Study 1. The researcher conducted ethnographic research over the period of a month. During this time the researcher took part in the general pastoral and recreational activities in the summer camp and conducted informal interviews with a number of participants. Following the period of ethnographic fieldwork participants were asked to complete round-robin Prestige and Dominance scaled questionnaires (Cheng *et al.*, 2010) and measures of perceived social status (Cheng *et al.*, 2013). For all questionnaires, scales ranged from 1 (*not at all*) to 7 (*very much*). As these questionnaires were round robin, participants self-rated and peer-rated Prestige, Dominance and perceived social status for all other participants. Therefore, all participants had a total of 21 peer ratings of Prestige, Dominance and perceived social status. Participants completed their own responses with a carer, translator and the researcher present to answer any

questions. All questionnaires were completed by hand by the participant and later anonymised and entered into a database by the researcher.

Subsequent to this, participants were further asked to complete name generator questionnaires. Participants were asked to nominate two others in the group: 1) who were their closest friends within the group, 2) who controlled the group's resources, 3) who were the most cooperative. Following each name generator, participants were asked to provide a qualitative response explaining why they chose the specific target. A native-Hungarian translator and the researcher translated all responses from Hungarian into English. Again, participants completed their own responses with a carer, translator and the researcher present to answer any questions.

Results

Preliminary analyses

As in Study 1, participant's round robin Prestige, Dominance and Perceived social status scores were computed by implementing the social relations model, using SOREMO (Kenny, 1998). Indegree centrality within friendship, cooperation and resource control networks were then computed using UCINET (Borgatti et al., 2002) and to ensure that the data fit the assumptions of regression for hypothesis testing, indegree centrality scores were normalized.

Following this, to test the validity of the friendship network as a measure of perceived influence, correlations between key variables were calculated using Pearson's correlations. As shown in table 4, centrality in a friendship network had a strong correlation with measures of perceived influence, confirming that the two measures captured the same construct. Interestingly, cooperation and resources control centrality was also highly correlated with both friendship centrality and perceived influence.

Network Visualisation

For visual representation of the social networks, prestige and dominance scores were mean split on SPSS and input as separate attributes on UCINET. These attributes were coded as high Prestige or Dominance = 1, low Prestige or Dominance = 0. High Prestige and High Dominance were used to alter node properties in Netdraw within UCINET for all three networks that were generated. Indegree centrality analysis was conducted and centrality was included as an attribute in all networks. Node

size was determined by each node's indegree centrality and node colour by whether the node was high in Prestige or Dominance.

Table 4.

Descriptive statistics and correlations among dominance, prestige, perceived influence and network centrality.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. Dominance	4.00	3.52	-	-	-	-	-	-
2. Prestige	4.37	0.93	-.437*	-	-	-	-	-
3. Age	15	3.52	.164	.378	-	-	-	-
4. Perceived Influence	4.11	1.26	.451*	.509*	.725**	-	-	-
5. Centrality (Friendship)	.236	4.33	.312	.300	.439*	.632**	-	-
6. Centrality (Cooperation)	3.86	8.05	-.135	.644**	.351	.565**	.663**	-
7. Centrality (Resource Control)	9.00	5.93	.702**	-.215	.368	.464*	.595**	.060

Note. $N = 22$.

* $p < 0.05$.

** $p < 0.001$.

Hypothesis Tests

To test Prediction 4, friendship centrality was initially regressed onto prestige, dominance and age within a multiple regression. Following this, centrality within a cooperation network, and then resource control, were regressed onto prestige dominance and age. All three multiple regression models were significant.

Table 5.

Multiple regression models with predictors of centrality within friendship, cooperation and resource control networks.

Variable	Centrality					
	Friendship		Cooperation		Resource Control	
	<i>B</i>	95% CI	<i>B</i>	95% CI	<i>B</i>	95% CI
Constant	-17.26	[-31.54--2.97]	-55.45*	[-103.75--7.20]	-22.65*	[-45.33-.01]
Prestige	.466	[-.43--4.74]	.700**	[3.16-20.65]	.012	[-4.00-4.21]
Dominance	.480	[-.26--4.26]	.159	[-5.21-10.10]	.658**	[1.50-8.70]
Age	.116	[-.50-.79]	.037	[-2.02-2.36]	.161	[-.663-1.40]
R ²	.340		.442		.519	
F	3.090*		4.755**		6.472**	

Note. *N* = 22. CI = Confidence Intervals.

* $p < .05$.

** $p < .001$.

No predictor variables had significant effects within the multiple regression model assessing centrality in an friendship network. Whilst there were no significant predictors within this model, the positive medium-sized, positive trends for prestige and dominance to predict centrality within the friendship network suggests that the hypothesised relationship may exist. Within the cooperation network results indicated that, as predicted, prestige was the only predictor variable to have a large, significant effect within the regression model determining centrality. Moreover, Dominance was the only predictor variable to have a large, significant effect within the regression model determining centrality within a resource control network.

To test whether dominant individuals lessen the cohesion within the networks that they operate, Full network cohesion and average sociocentric density were calculated in UCINET. Sociocentric density (0.095) and Cohesiveness were low (0.021). These results may indicate that the network is decentralized (White, 1999) and may indicate that individuals who are high in perceived dominance, who occupy positions of influence, may cause there to be low cohesion. However, these results have not been compared to the density and cohesion of other networks. Therefore, given the lack of comparator group to test these results against, this interpretation is speculative and has not been empirically tested.

Discussion.

Prestige is related to cooperation in a network.

Individuals within human groups freely bestow prestige upon certain individuals (so-called prestigious models) due to their perceived ability and skill (Henrich & Gil-White, 2001). The reliance that prestigious models have on others within the group creates a transactional relationship between prestigious models (or leaders) and infocopiers (or followers: Price & Van Vugt, 2014), where infocopiers attempt to maximise the utility of their choice of prestige model based on a number of physiological, personality and behavioural cues. The reliance that prestigious models have on the others within their group to attain and maintain influence selects for more prosocial personalities (Cheng et al., 2010). These personalities are underpinned by altruistic, prosocial behaviours and cooperation towards conspecifics (Hardy & Van Vugt, 2006; Van Vugt et al., 2008). Numerous examples of competitive altruism and cooperative acts have been observed in skilled hunters among numerous small-scale societies, with men often sharing the spoils of the hunt equally among the community (e.g. Hawkes et al, 2001).

As predicted, the current research provides further evidence in support of the relationship between prestige and cooperation, as prestige was a highly significant predictor of centrality within a cooperation network. This indicates that, within the current population, individuals high in prestige were nominated by other members of the group as being the most highly cooperative. Akin to previous studies within the literature, the more cooperative individuals were the most central within the network. In a number of public goods games, this relationship has been observed, with the biggest contributors being perceived as the highest in status when contributions were visible to all players (Willer, 2009; Willer et al., 2010). The current research fits neatly into this body of literature that suggests that individuals may track both the number and the breadth of cooperative acts of others within a group, which in turn allows reputations to be formed (Fu et al., 2008; Macfarlan & Lyle, 2015). For example, among communities of Caribbean Bay tree cultivators in the Dominican Republic, individuals who helped more with economic production had greater prosocial reputations, are preferred as labour exchange partners and further receive labour from more individuals than non-cooperative individuals (Macfarlan et al, 2013). Alike to this, the current research indicates that those more central in a cooperation network are higher in prestige and, therefore, suggests that prestige is not only related to an individual's skills and abilities, but also the prosocial reputation of an individual. This, moreover, infers that the status and influence of a prestigious individual is

dependent on their prosocial reputation, which is underpinned by their personality and the cooperative acts that the individual performs.

As shown in figure 6, the most highly prestigious occupied central positions within the network, whilst individuals high in dominance were peripheral and dominance did not have a significant relationship with cooperation. This emphasises the distinction between prestige and dominance. Unlike prestige, influence attained through dominance is not necessarily given to an individual. Rather, this influence is seized through fear, aggression and coercion (Henrich & Gil-White, 2001) and is further taken to fulfil egocentric, selfish desires and ambitions (Cheng et al., 2010). Therefore, dominant individuals do not necessarily need to cooperate with conspecifics to obtain and maintain their influence.

Dominance is related to control of resources in a network.

Antithetic to its association with cooperation, dominance was highly predictive of centrality within a resource control network. As predicted, and as outlined in table 5, individuals high in dominance were nominated most as controlling the group's resources. Due to socio-cultural norms and structures, outright agonistic dominance, using physical violence and intimidation that has been observed in non-human primates (i.e. wild bonobo (Furuichi, 1997) and chimpanzee (De Waal & Hoekstra, 1980; Chase et al., 2002) is not necessarily effective in human hierarchies (Boehm, 2009). Rather, dominance can be more effectively wielded through the control of valuable and important resources, be they socio-sexual or material. For example, among child and early adolescent groups, dominant individuals often utilize resource control strategies, having a monopoly over socially valued toys, and are, moreover, in positions of influence and power within their groups (Hawley, 1999; Hawley et al., 2009). Evidence also suggests that a macro-level, companies that have a monopoly over valued resources within the market become highly influential and have higher leveraging power over their counterparts (Pfeffer & Salancik, 2003). The current research provides further evidence that resource control, as dominant individuals may successfully use a strategy for attaining and maintaining influence and rank at a micro-level.

The results of the current research further highlight the divergent strategies associated with and employed by prestigious and dominant individuals. Dominant individuals do not need to foster cooperation, and are not reliant on a prosocial reputation, to obtain and secure their power. Dominance is underpinned by fear and coercion (Henrich & Gil-White, 2001; Cheng et al., 2010). Procuring and having power over valued resources allows a dominant individual to coerce and manipulate conspecifics, allowing the individual to obtain their goals through egocentric, Machiavellian strategies that may harm the group (Hawley, 2003; Case & Maner, 2014).

Contrariwise, as previous evidence and the current research suggest, prestigious individuals are more cooperative and are willing to altruistically share the valued resources that they have obtained (Gurven et al., 2002; Apicella et al., 2012). This relationship between resource control, prestige and dominance, emphasises that these are two distinct traits that have different associated behaviours, which lead to rank attainment.

As shown in figure 7, the individuals high in dominance were the most central within the network, whereas only three individuals high in prestige and one individual low in both prestige and dominance were nominated by conspecifics as controlling the group's resources. Within the sociogram, is that the majority of the group's nominations were for Phil, the individual scoring highest in dominance. Following Phil, Miranda was the second most-nominated individual, who had the highest dominance score among females within the group. These results suggest that, whilst being in the same group, dominance seems to predict success in both intrasexual and intersexual competition for the control of resources. On the other hand, the results may simply suggest that individuals high in dominance are more highly motivated to obtain resources to cement their power within the group. However, evidence would suggest that the former explanation is most appropriate. Individuals high in prestige are also highly motivated to obtain resources, as it is a signal of competence and skill, and generally the individual's social value as a social partner (Von Reuden, 2014). Yet, what is important to note is, prestigious individuals are motivated to obtain resources for a different outcome to dominant those high in dominance. Specifically, the resources that individuals high in prestige collect are shared, and cue both their resource gathering potential and also their prosocial tendencies, which are both fundamental to the acquisition and maintenance of influence through prestige. Dominant individuals selfishly harbour resources as a means to coerce deference and bend conspecifics to their will.

Prestige and Dominance may be related to centrality in a friendship networks.

Prestige and dominance did not significantly predict centrality in a friendship network. This is somewhat surprising, as previously literature would suggest that associated behaviours (i.e. antisociality, prosociality and aggression) that comprise dimensions within these traits do have a strong, significant relationship with obtaining and maintaining friendship ties. For example, within a number of longitudinal classroom surveys during childhood and adolescence, aggressive behaviour was found to have a positive effect on friendship tie creation over time (Rambaran et al., 2015); antisocial, norm-breaking behaviour was deemed 'cool' by conspecifics (Allen et al., 1989); antisocial behaviour was found to predict popularity in some classrooms and not others (Laninga-Wijnen et al., in press); and also that prosocial, cooperative behaviours had considerable influence over popularity (Dijkstra et al., 2009). This growing literature suggests that friendship, alike to social rank,

allegiances and coalitions, is not necessarily determined by likability, but is driven by the necessity for and immediate value of being associated with certain individuals (Parkhurst & Hopmeyer, 1998).

Whilst the current research does not provide any significant results in support of this notion, results do indicate a positive trend for both prestige and dominance to predict friendship ties. As shown in figure 5, the friendship network is not highly centralised, but the individuals who are the most central are either high in prestige (purple nodes) or dominance (red nodes). The individual highest in prestige (Craig), followed by the individual second highest in prestige (Andrew) received the most friendship nominations. Contrariwise, the sociogram also indicates that participants low in both prestige and dominance (black nodes) were the least central and, surprisingly, did not receive any friendship nominations. Whilst there may be a lack of statistically significant results, the visualisation of the friendship network further indicates that those high in prestige and dominance, at a qualitative level, received greater friendship nominations and, in turn, were more central in the network.

The lack of significance could suggest a lack of salience for both prestige and dominance within the current research population, as the salience of certain behaviours and personalities may be constrained by context and situation (Hartrup, 1993). However, given the results found in Study 1, and the correlation between perceived influence and friendship, it seems that the small sample size warrants caution in interpreting the results. As the study is extremely underpowered and there is a great deal of noise within the data, the predictive abilities of prestige and dominance have been lessened and, therefore, may not be particularly representative or reliable. In sum, the current research has provided novel theoretical insights into the relationship between prestige, dominance and friendship, and has produced empirical data that suggests some pilot support for the hypotheses. The outcomes of the current research thus provide a platform for fruitful future research.

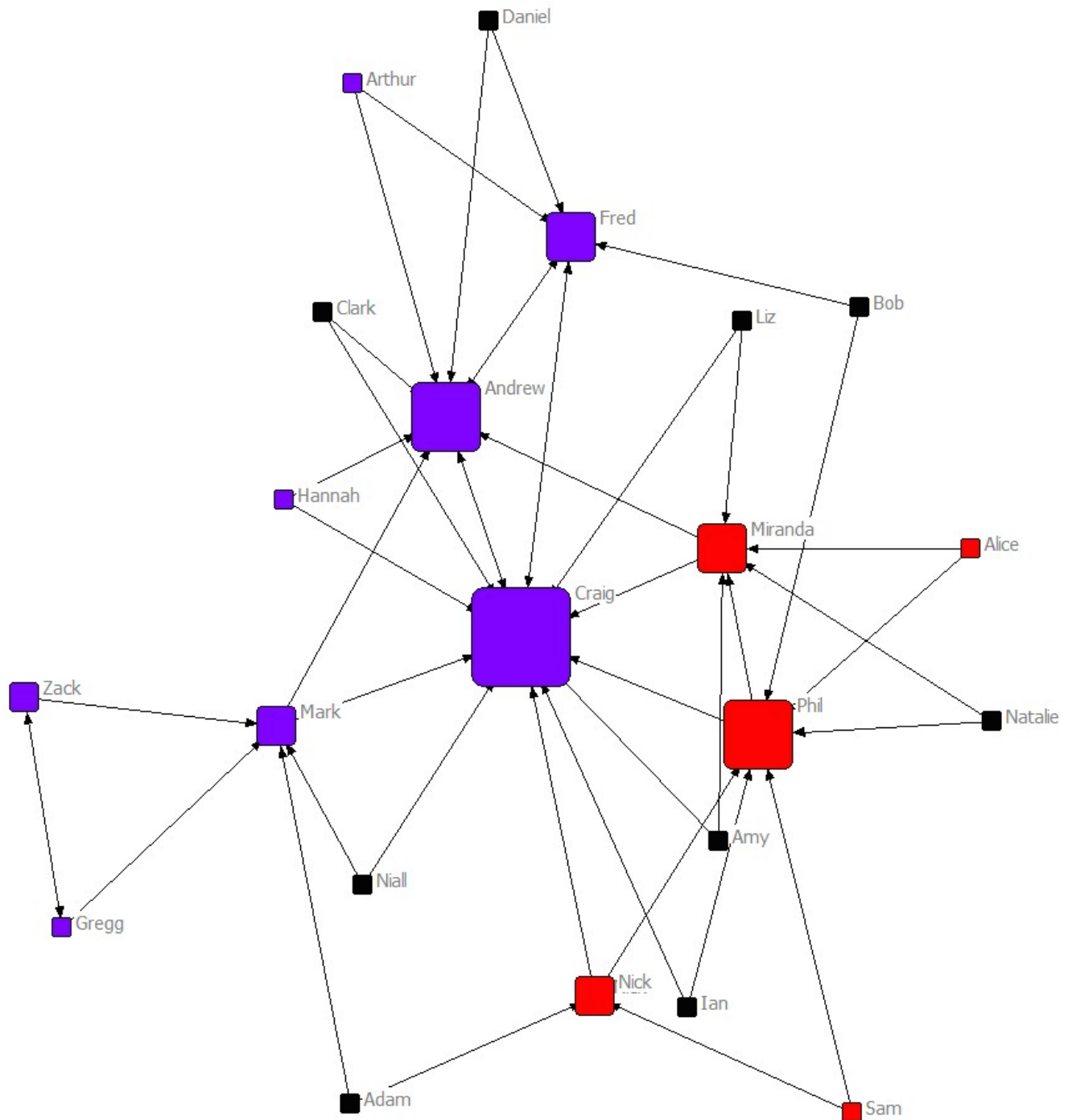


Figure 5: Network visualization of the friendship network within the current population

Note. The graph shows the indegree distributions of participant who were nominated as friends within the group. Node size was determined by the node's indegree centrality. Names given to nodes were randomly assigned and are reflective of the participant's sex. Purple nodes are participants who scored highly in prestige, red nodes are participants who scored highly in dominance and black nodes are participants who scored low on both prestige and dominance.

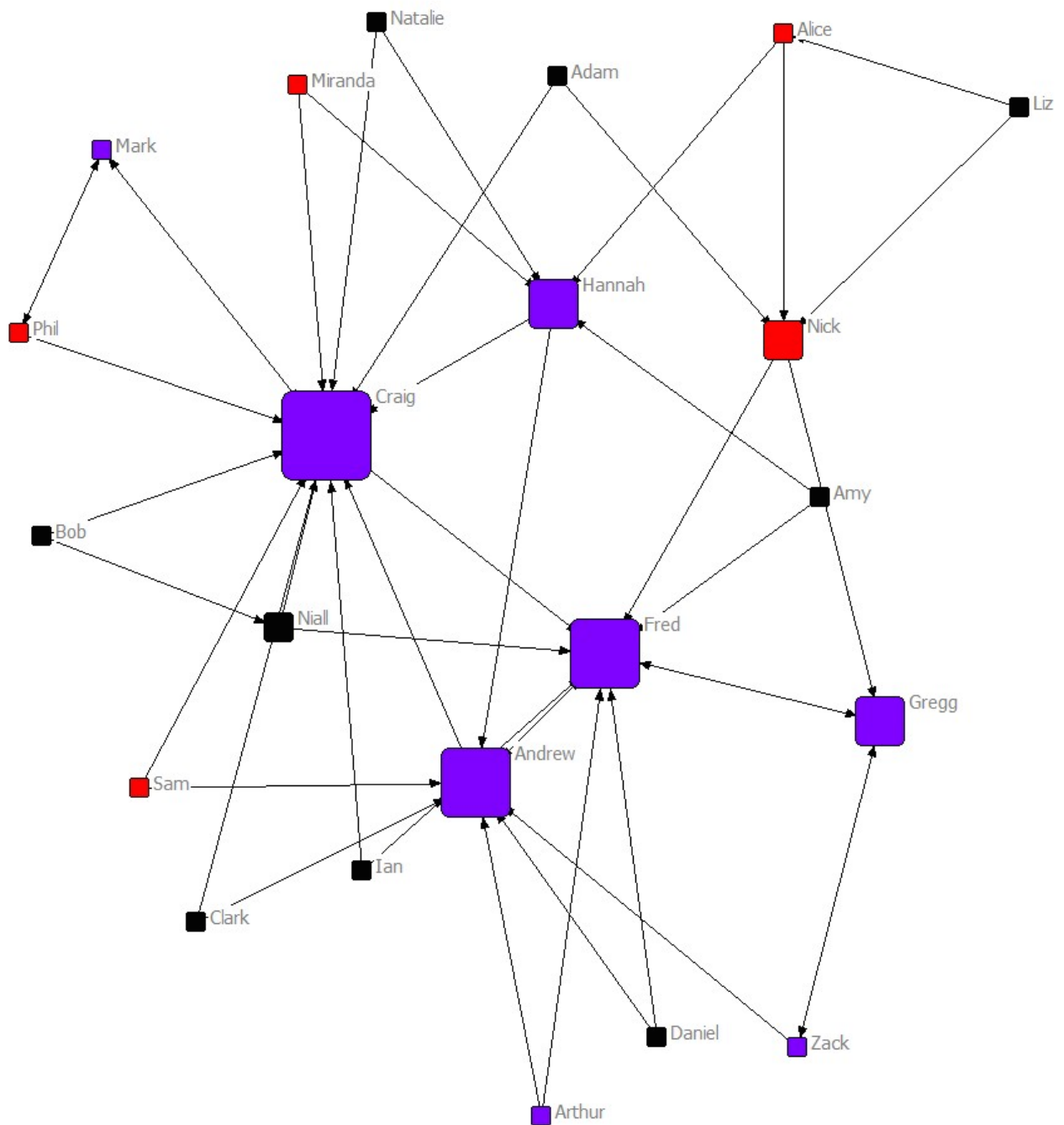


Figure 6: Network visualization of the cooperation network within the current population.

Note. The graph shows the indegree distributions of participant who were nominated as the most cooperative within the group. Node size was determined by the node's indegree centrality. Names given to nodes were randomly assigned and are reflective of the participant's sex. Purple nodes are participants who scored highly in prestige, red nodes are participants who scored highly in dominance and black nodes are participants who scored low on both prestige and dominance.

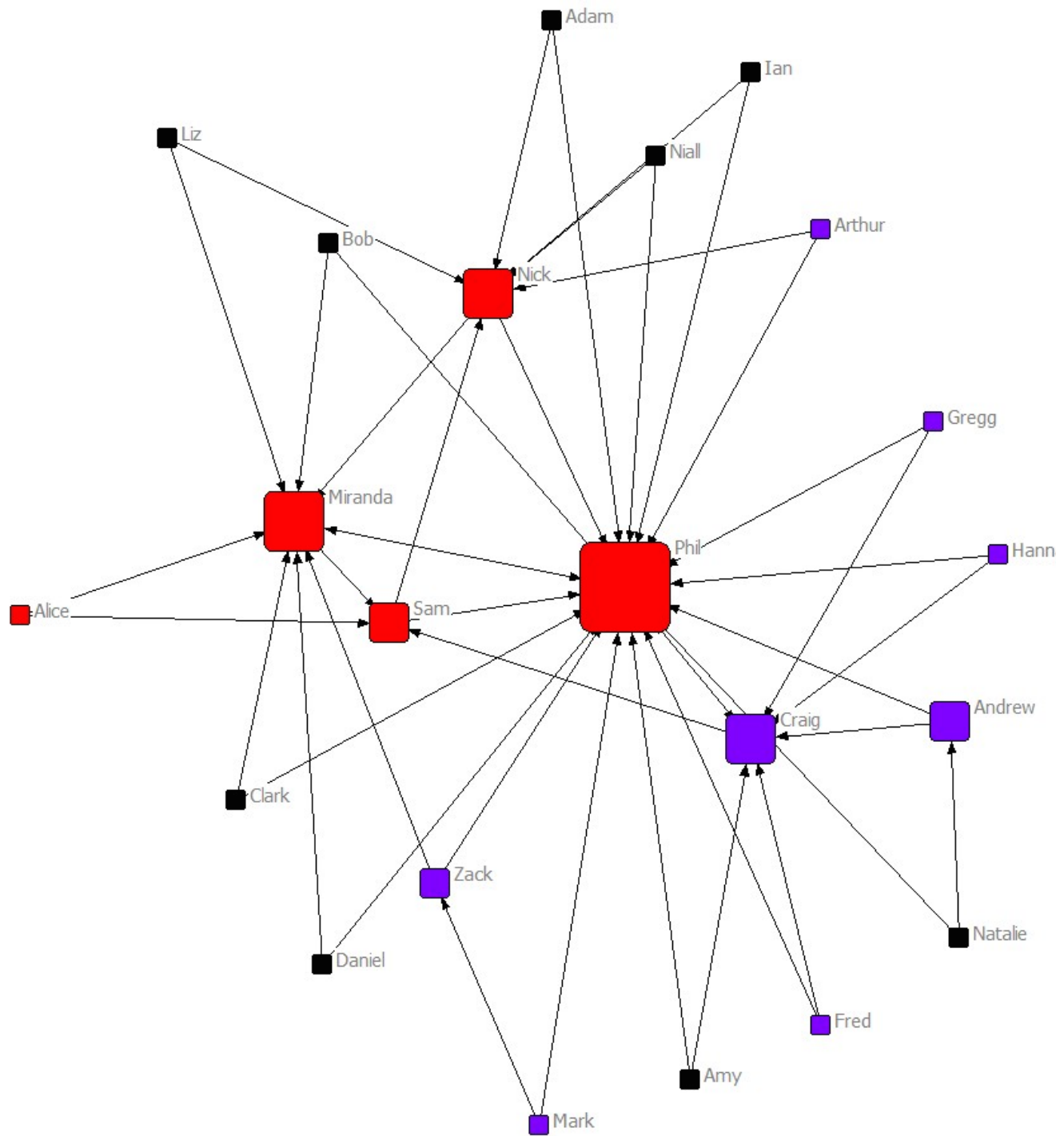


Figure 7: Network visualization of the resource control network within the current population
Note. The graph shows the indegree distributions of participant who were nominated as individuals who controlled group resources most. Node size was determined by the node's indegree centrality. Names given to nodes were randomly assigned and are reflective of the participant's sex. Purple nodes are participants who scored highly in prestige, red nodes are participants who scored highly in dominance and black nodes are participants who scored low on both prestige and dominance.

8

General Discussion & Conclusion

By using a novel methodological approach that tests a previously unrepresented population, the current research provides insights into the dual model of social hierarchy and important implications for the relationship that prestige and dominance has with influence in a developmental setting and also their relationship with social networks.

Prestige and Dominance in a Developmental Context

As hypothesized, results of the current research suggest that both prestige and dominance promote an individual's influence in a naturalistic, developmental setting. Through a novel methodology, and within a previously unrepresented population, the current research provides evidence for prestige and dominance both being routes to social rank within a group that all stages of childhood and adolescence. Results of the current research suggest prestige to be the most significant predictor of influence within the current context. These results further support the notion that children may have an innate predisposition to selectively learn from those who attempt to communicate beneficial information (Csibra & Gergely, 2009, and that, in turn, prestige bias may also operate within developmental hierarchies (Chudek et al., 2012). In line with previous research (Flynn & Whiten, 2012; Hawley, 2014), dominance was in line with prestige as a predictor of an individual's influence within the group and is, therefore adaptive.

The results further indicate that age has an interaction with prestige and dominance. Within the current context, older individuals who were high in prestige and dominance were more influential than younger individuals high in prestige and dominance. Given the current setting, the results suggest that the efficacy of prestige and dominance increases with age. As a number of traits associated with prestige and dominance are deemed as forms of embodied capital, the older an individual is during development, the more developed the trait is, be it a physiological trait or a personality trait (Gurven et al., 2014). For example, individuals may be higher in prestige due to age being a cue to competence, and, thus, make individuals more attractive as models for social learning (Wood et al., 2013), whereas older individuals are likely taller and more muscular, causing their propensity to induce fear to be heightened (Undurraga et al., 2012). Therefore, in the context of the current research, the expression of prestige and dominance is strong in older participants.

Prestige, Dominance and Marginalization Among Romanian Orphans

An important contribution made by the current research is that it provides evidence in support of hypothesized relationship between dominance and marginalization. Specifically, the current research found that self-perceived marginalization was the only significant predictor of dominance in the current group and, conversely, has a highly significant negative effect on an individual's prestige. As

predicted, individuals who perceived themselves as being most marginalized in wider society scored more highly in dominance, which suggests that individuals may turn to antisocial behavioural strategies and learn to become more dominant when legitimate, prestigious routes for obtaining their social and material goals are blocked.

Moreover, the current research opens up the dual model of social hierarchy to cross-cultural comparison, as the research population in question is a previously unrepresented community (Romanian Cigáni). Contrary to predictions, neither ethnicity nor gender were significant predictors of influence or prestige and dominance. Given the current context, ethnicity was hypothesized as being important for prestige and the attainment of influence, as the majority of the research population were Cigáni, a marginal and oppressed group within Romania. An explanation for this is the small sample size of the current research and the relatively small representation of non-Cigáni. To the best of our knowledge, the current research is the first to test Cheng et al.'s (2010) prestige and dominance scaled-questionnaires in a cross-cultural context. The results of the current research support the dual model of social hierarchy among the Romanian Cigáni and, moreover, the community of Romanian orphans. Whilst supporting that both prestige and dominance are important predictors of social rank within a previously unrepresented population, the results of the current research highlight the importance of social context and of testing the dual model of social hierarchy among non-W.E.I.R.D. (Henrich et al., 2010) populations.

The Relationship Between Prestige, Dominance and Social Networks

The current research provides the first evidence that tests the dual model of social hierarchy within social networks. The results presented have clear implications for the field, indicating that the efficacy of prestige and dominance may be dependent on the types of networks being measured. Specifically, the current research highlights the distinction between prestige and dominance, suggesting that prestige is associated with centrality within a cooperation network and dominance with centrality within a resource control network. These findings are complimentary and, through integrating social network analysis, build upon previous research that suggests a relationship between dominance and resource control in a developmental context (Hawley, 1999, 2003; Hawley et al., 2009). Moreover, these findings suggest that those perceived as highest in prestige are also believed to be the most cooperative by other members of the group. In sum, the results of the current research provide evidence that the ability to procure resources, and thus competence in a socially valued domain may be associated with both dominance and prestige (Chapais, 2015). However, prestige and dominance affect the way in which individuals act once the resources have been obtained, with dominant individuals maintaining their power over the resources, whilst prestigious individuals generously and cooperatively share them. Furthermore these findings suggest that competence may

be foundational to both prestige and dominance. But it is how and when this competence is employed that produces the differential effects (namely fear and respect) that are outlined by the dual model of social hierarchy.

In addition, the current research suggests that prestige and dominance may have a relationship with the formation of friendship networks and further suggesting. Whilst results do not provide significant evidence for this relationship, the associated network diagrams indicate that those most central within the friendship network were high in either prestige or dominance. These results provide indefinite evidence in support of recent advances within both developmental psychology (Hawley, 2014) and social network analysis (Dijkstra et al., 2009; Rambaran et al., 2015; Laninga-Wijnen et al., in press) that suggest that friendship ties within networks may not be solely determined by likability. Rather, individuals choose friendships based on the social value of being associated with an individual.

Limitations

Although the current research does contribute to understanding the dual model of social hierarchy, there are a number of limitations that prevent the studies from fully achieving their ambitions. Predictions made about the effects of prestige and dominance on network structure were not effectively tested due to the lack of comparator group. Without a reference group, the density and cohesiveness measures were made somewhat redundant. The methods reported relied only on self and peer-report measures and were not validated by qualitative data on actual observations of behaviour. The current research would have been improved if ethnographic observations were collected and used to form social networks and data measuring the behaviours associated with prestige and dominance that were used by participants. The sample size of the current research was inadequate to reliably test the predictions made and, having only twenty-two participants, the statistical models employed may not have been stable and, therefore, may only be interpreted as pilot data.

Conclusions and Future Directions

Whilst the results and interpretations presented in the current research are far from conclusive, the evidence provides a solid platform for future research. The evidence presented opens a direction for investigation the relationship between prestige, dominance and social networks. Specifically, how prestige and dominance may affect the structure of social networks and also an individual's position within multiplex and longitudinal networks. The current research provides evidence that suggests that prestige and dominance may operate effectively in different networks that may allow an individual to

acquire social rank, which may afford fruitful future empirical research, both naturalistic and experimental.

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